Railway Age

Vol. 64. March 15, 1918 No. 11

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EDWARD A. SIMMONS, *Pres.* L. B. SHERMAN, *Vice-Pres.* HENRY LEE, *Vice-Pres. & Treas.* M. H. WIUM, *Secretary.*

CHICAGO: Transportation Building. **CLEVELAND: Citizens Building.** **WASHINGTON: Home Life Building.**

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EDITORIAL

Railway Age

The Railway Business Association is to be congratulated on the vision of its leaders who are guiding it into channels for greater usefulness, the possibilities of which are simply tremendous. It is not too much to say that it has within its grasp opportunities which if rightly used will make for the future welfare and prosperity of the entire country. A "call to arms" of all the supply interests, which has been sent out by the executive committee of the association, will be found elsewhere in this issue. The meeting, which will be held in Chicago on April 8, promises to be one of the most important events in the history of the railways and railway supply interests in this country.

A Great Opportunity

The building of standard locomotives to meet all conditions on American railways is impracticable. This we have demonstrated clearly in recent issues. The Government's standardization committee has been working a month on this problem. If it is attempting to formulate standard designs for all types of locomotives it is working to no purpose. By far the most practical thing to do is to design one or two locomotives which will be suitable for common use or as floating equipment. As far as possible power, for use on individual roads should be built to each road's standards, which are especially suited to its peculiar conditions. To attempt to go further than this is inexpedient and a waste of time—and time is the most potent factor in this war.

Extensive Standardization Impracticable

The Interstate Commerce Commission's final summary of railroad revenues and expenses for December has been published this week. In December, of course, the roads were being operated without any Government guarantee of net income and without Government control. Transportation expenses averaged $646 per mile of road in December, 1917, as compared with $490 in December, 1916. This was for the entire United States. In the East transportation expenses averaged $1,207 per mile in 1917 and $914 in December, 1916. Because of weather conditions, January and February were both worse than December in respect to cost of operating trains; but take December and try to get some conception of what this increased cost meant. Visualize any piece of track a mile long that you are in the habit of traveling over. If this piece of track is in the East, it costs about $300 more for enginemen's and trainmen's wages, fuel and lubricants to move the trains that passed over that mile of track in December, 1917, than it did in December, 1916. The freight trains were on an average considerably shorter in December, 1917, than in December, 1916. The freight they carried yielded considerably less revenue for each train in 1917 than in 1916. As a matter of fact the total revenue from freight for all the trains moving over that mile of track was a few dollars less last year in December than in December of the year before. Multiply this increase of $300 in trainmen's wages and fuel by the number of miles covered in the hour's trip between Washington and Baltimore. There was an *increase* of $12,000 in the single month of December, assuming that this piece of road was near the average for the Eastern territory. As a matter of fact, probably the increased cost on this particular forty miles was far greater than the average. Liken the operation of one mile of railroad to the business of a corner grocery store; how long would the groceryman stay in business if he had not been permitted to raise his prices in December, 1917, as compared with the same month in the previous year, and had had to pay out in wages and for his goods $300 more than he had paid the year before? Everybody now acknowledges that railroad expenses are mounting tremendously, but it is worth while to stop and try to translate the figures for this increase into the homely things that we all deal with every day.

What It Cost in December

Is it any wonder that the railroads have difficulty in obtaining competent supervision in their shops when a man has to make a sacrifice in his earnings to become a foreman? Is it any wonder that the heads of the mechanical department complain that they can't keep competent foremen on the job when we see such conditions as that where, out of about 700 workmen in one shop, last month, five received more wages than the general foreman, eight more than the assistant general foreman, 11 more than the boiler and machine shop foreman, 16 more than the blacksmith foreman, 69 more than the erecting shop foreman and 147 more than the gang foreman? Can a man be blamed for resigning his position when those under his charge, and for whose work he is responsible, are getting more money than he? Full cognizance must be taken of existing labor and living conditions if the shops are to retain and obtain competent men to supervise the work.

Supervision Must Be Adequately Paid

There was a meeting of railway executive officers in New York on Monday, presided over by Frank Trumbull, chairman of the Railway Executives' Advisory Committee. In the statement given out after the meeting, it was pointed out that the agreements between the individual companies and the government, which will have to be arrived at, should be actuated by a spirit of co-operation and we may surmise, therefore, that the meeting on Monday was a "get together" affair rather than any attempt to determine upon a fixed general policy of action. As any close student of the present situation knows, there are a great number of questions which will have to be settled between each individual road and the government. For instance, the question of continuance or discontinuance of detailed accounting figures; and the question of the adequacy of maintenance. There are also the questions pertaining to the financing of the needs of the railroads. It is the desire of the majority of railroad executives to help the government, both in regard to the sale of Liberty Bonds and the financing of railroad extensions, etc.—necessitated by war conditions—to the full extent of their ability. It may be that with Director General McAdoo's approval, some roads at least can sell their own

Railway Executives' Advisory Committee

securities to pay for additional facilities urgently needed by shippers and the government. It may be that in other cases the government itself could better afford to lend the roads money. The Railway Executives' Advisory Committee has never been as invaluable to the railway companies and the government both as it is at present. Even if every single railway president in the country were actuated with the single desire to be as helpful to the government as possible, it would still be necessary, if this desire was to be made effective, to have concerted action. The Railway Executives' Advisory Committee can act as a clearing house for intelligent and patriotic discussion of the complex detailed questions which will arise between the government and each individual road. It can on one hand educate the railroad men and on the other co-operate with the director general.

The Test of Efficiency Under Government Control

SEVERAL LARGE RAILWAY SYSTEMS are handling less freight now than they were a year ago. We have in mind one system in particular which is moving so much less freight and earning so much less money that if government control, with its prospective guarantee of net return, had not been adopted the company would be in danger of bankruptcy. If the efficiency with which this railway is being operated could fairly be measured by the total traffic it is handling now, as compared with the total it was handling a year ago, government control might properly be condemned or the officers of the railway might justly be convicted of "lying down." And yet, measured by the standard which ought to be applied, this railway is being operated with greater efficiency than formerly. Its situation calls attention forcibly to the fact that the standard by which officiency of operation was properly measured a year ago and the one by which it ought to be measured now, are entirely different.

The standard which properly was applied a year ago, when the country was at peace, was the amount of business of all kinds which a railway moved in proportion to the facilities it had and the expenses it incurred. The purpose for which government control was adopted was to make the railways more efficient instrumentalities, not merely for moving all kinds of traffic, but for helping win the war. Therefore, the standard which ought to be applied now, is how effectively each railway is being used to help accomplish this purpose. The railway in question is a large carrier of coal, and is located in the immediate territory where there is the greatest activity in the manufacture of munitions. The Railroad Administration believes the most effective way in which it can contribute toward winning the war is to move the largest possible volume of coal to Eastern destinations. One of the most important parts of its main line is, therefore, being used almost exclusively to carry coal; and it is moving a great deal more coal now than ever before. But this part of its line, when thus devoted almost exclusively to carrying coal, cannot, of course, handle as much traffic of other kinds originating on other parts of its lines as formerly; and as traffic of other kinds originating on its other lines cannot get through without moving over this busy line, the railway is unable to handle anywhere near as much business as formerly on its other lines. In consequence, it is handling a greatly increased business over a small part of its mileage, and, for this very reason, a greatly reduced business over most of its mileage.

The total amount of business which the railways will handle under government control will continue to be one measure of their efficiency, but it will be, while the war lasts, a secondary rather than a primary test. The primary test will be how successful they are in moving traffic whose movement is essential to the winning of the war. Of course, a broad view of what traffic is essential must be taken. The people of the country must live and they must prosper while the war is going on; and it would be easy to make the mistake of concentrating excessive attention on the movement of foodstuffs, coal, munitions, etc. At the same time, in justice both to the Railroad Administration and to the managers of the individual railways, the fact that under these abnormal conditions the old standards of efficiency cannot fairly be applied should be recognized.

The Problem of Increased Track Capacity

AT THE PRESENT TIME under the unified operation of the railroads, other conditions being equal, an effort is being made to route traffic over the lines that will give the shortest haul. This may throw a large amount of business over lines which heretofore have carried only a medium amount of traffic, and one of the problems requiring solution is the handling of this increased amount of traffic in as expeditious a manner as possible. One method of meeting this situation is by the building of additional yards and main tracks, but with the present conditions existing in the labor and material markets such a program would require a considerable length of time before any noticeable results could be obtained. Such construction would also require the use of work trains during the entire time the work is under way, taking motive power, trainmen and cars from other important service. With the above conditions existing it would seem advisable to consider other possible alternative methods of accomplishing the same results.

Train operation is governed by the manual block system over a number of lines that are now handling increased traffic. This system posseses advantages for certain classes of service, but the maximum traffic capacity is not obtainable as the number of block sections necessary for the movement of the maximum number of trains would involve a very high cost for wages of block operators. Another disadvantage of the manual block system is that the length of the blocks is not fixed; in many cases they are very much shorter during the day than at night when the closing of some of the offices necessarily lengthens the distance from one block station to another, with consequent delays to trains. The safety factor of this system is also low in comparison with that of automatic block signals.

With automatic block signals the maximum capacity of the tracks can be secured, as the block section lengths can be arranged for the movement of the largest number of trains. These blocks are always of a fixed length, thus eliminating delays of trains, following one another, where it is necessary to increase the length of blocks by the closing of offices at night. The force of men required for the operation and maintenance of an automatic block system is comparatively small and the safety factor of the system is high in comparison with that of the manual block. As stated by one superintendent, "on the division of 107 miles (82 single, 25 double track), handling the usual business would require 22 additional operators to handle the traffic by manual block, an expense of approximately $18,500 per annum." In addition to increasing the track capacity the above statement shows only one of the savings resulting from the installation of an automatic block system in place of the manual block.

This method of increasing track capacity should receive careful consideration from operating officers, as such a system can be installed in a comparatively short length of time, with a considerably smaller force and far less work train service as compared to the building of additional track facili-

ties, and with a very low first cost as compared with that for additional tracks. The saving in man power, money and material in construction, and the low cost for operation and maintenance are also important factors to be considered at the present time.

"Reasonable" Rates Under Government Control

ONE OF THE HARDEST QUESTIONS which political economists, railway officers and railroad commissions have ever tried to answer is the question, "What are reasonable rates?" The railroad control bill, as reported by the conference committee and as apparently it will become a law, impliedly gives the answer which should be made to this question at least during the period of control.

It provides that the President may initiate rates which "shall be reasonable and just and shall take effect at such time and upon such notice as he may direct." The Interstate Commerce Commission, upon complaint, may investigate and determine whether the rates fixed actually are reasonable. If, however, the President shall certify that in order to defray the expenses of federal control, operating expenses, ordinary taxes and compensation to the carriers it is necessary to increase earnings, the Commission in determining the reasonableness of the rates, must take into consideration this certification of the President. The bill does not say that the Commission must make the rates high enough to cover all expenses, ordinary taxes and compensation to the carriers; but that it is the desire and expectation of Congress that it will do so is made plain.

Various views have been put forward as to what constitutes a reasonable schedule of rates. Some have contended that each rate charged should be made fairly proportionate to the service rendered for it, and that if this were done rates as a whole would be reasonable. Others have contended that a reasonable schedule of rates would consist of rates which were fairly adjusted in relation to each other and would as a whole yield a fair return on the fair value of the property devoted to public use, and no more. Still others have contended that a reasonable schedule would consist of rates which were fairly adjusted in relation to each other and which as a whole would enable the carriers to earn large enough profits to attract into the railway business enough capital adequately to develop transportation facilities.

Most of the regulating authorities have adopted and acted on the "fair return upon a fair valuation" theory. They have persistently ignored the fact that a "fair return upon a fair value," as the courts use the phrase, means merely a return which will not be absolutely confiscatory, and that such a return may be entirely inadequate to attract sufficient new capital into the railroad business. Furthermore, they have not been consistent in carrying out even this restrictive theory. Even on the principle of a "fair return" there necessarily comes a time, in a period of rapidly advancing wages and prices, when rates must be substantially increased. The last few years have been such a period, but the regulating authorities have not allowed sufficient increases in rates to offset advancing expenses.

Government control creates a new situation. The returns of the companies are to be guaranteed. So long as this is done the government must pay increased expenses, and it must secure the means for paying them either by advancing rates or by advancing taxes. Congress has tacitly recognized the fact that the regulating authorities have failed under private control and might fail under government control, in the absence of specific legislation on the subject, to advance rates enough to offset increases in expenses. Therefore, it, in effect, specifically requires the Interstate Commerce Commission to do this. Nobody entertains the thought that when the government has to pay the bill the state regulating authorities will be allowed to fix state rates lower relatively than interstate rates. It would appear, therefore, that both state and interstate rates will be advanced, under government control, as expenses increase.

It is highly desirable from the standpoints of both the railways and the public that this shall be done. Whether the railways are to be returned after the war to the managements of their owners or are to be bought by the government, it will be expedient that there shall exist at that time a substantial parity of income and outgo. The adoption of government ownership seems to grow more improbable every day. The whole course of Congress in dealing with the railroad control bill has indicated that a large majority of its members are opposed to government ownership. A large majority of the newspapers of the country which have spoken on the subject also are opposed to it.

If private ownership is retained the precedent established by saying in the law, almost in express terms, that "reasonable" rates are rates sufficient to meet advancing expenses and also to pay a return on investment, may be important. The Railway Executives' Advisory Committee, in the hearings before the Newlands Committee, advocated legislation which, in effect, would have defined reasonable rates as rates which would cover all expenses and taxes and a return on investment sufficient to cause adequate expansion of railway facilities. These are the only kind of reasonable rates which will ever promote the prosperity and welfare of the country; and a step toward legislation requiring such rates, even when taken under the present abnormal conditions, is a hopeful sign.

Sanitation on Railroads

IT IS an unwelcome fact that the ideas of sanitation are still extremely primitive in many communities in this country, particularly in small towns and rural districts. Consequently it is not to be expected that either the employees or the local patrons of a railroad passing through such regions are particularly squeamish about the pollution of drinking water, contamination by flies, protection from mosquitoes, or other conditions generally frowned upon in more enlightened communities. Because railway trains, station buildings, eating houses and shops are gathering places for people in large numbers and frequently in close quarters, any unsanitary conditions prevailing become intensified and opportunities for the spreading of disease are increased. Consequently it devolves upon the railroad to maintain high standards of sanitation which means in many cases that the standards must be far above that of the communities through which it passes. Generally speaking this work is best handled under the direction of a trained sanitarian and a good idea of the problems with which this officer is confronted and the measures he must take to correct irregularities are covered in an article appearing on another page of this issue.

Sanitation on a railway involves two classes of activities. The first includes those which it takes as a common carrier to guard the health of its patrons and employees, and the second concerns the measures taken for the improved health and therefore greater efficiency of its employees. Under the first class the province of the sanitarian is limited largely to the condition of the surroundings with which the patron and employee come in contact. This problem must also be dealt with in the treatment of the employees in the shops, office buildings, and elsewhere, but if the measures taken by certain large industrial and commercial organizations are to be taken as a model, a much wider field is open for the sani-

tarian in educating the employee in the proper care of his health, not only while at work but in his home as well.

While the conduct of this policy has in some cases verged on paternalism the exercise of common sense will indicate the proper limitations in most cases, and these measures are paying large returns for the money expended through the increased efficiency of the employees, less loss of time from work, and improved esprit de corps.

Maintenance Work Must Be Pushed

WITH THE LEGISLATION relative to the control of the railways agreed upon and the passage of the act only awaiting ratification of the conference committee's action by the Senate and the House, the director general is now in a position to proceed with comprehensive plans for the betterment of the railway properties. One of the problems demanding the most urgent attention is the formulation of a definite policy regarding the routine maintenance as well as the additions and betterment work to be undertaken this year. It is now the middle of March and the roads are still without authority to proceed with plans for the season's work.

Work of this kind is very largely seasonal in character and much of it can be done to best advantage only during the summer months. During the last few years the roads have gradually come to realize the economy of starting the season's work as early in the spring as weather conditions permit. The shortage of labor and the large amount of work left unfinished last season have already given added impetus to this tendency. Many of the roads had their budgets for 1918 practically completed when the President issued his proclamation, taking them over on December 27, 1917. Since that time the initiative has passed largely into the hands of the director general and the preparation of plans by the roads has been almost at a standstill, awaiting his action.

The railways have recently been requested to furnish the director general with information concerning their minimum requirements for the year both for maintenance and for improvement work. In some instances, they have also consulted with the regional directors regarding their needs but they are still awaiting definite authorization to proceed. As a result of this condition over two months' time has been largely lost—time in which plans are usually completed, materials assembled and organizations perfected. The roads are now practically at the opening of the working season, less prepared to undertake actively the improvements which are so needed, than at any time for a number of years. This condition exists at a time when the roads are emerging from one of the most severe winters in history, during which they have handled a traffic exceeding all previous records. It also follows several years of sub-normal maintenance.

The factor limiting the amount of work which it will be possible to complete this year, as in the years just past, will undoubtedly be the amount of labor available. This makes it highly important that the roads enter the labor market at the earliest possible date before contractors, industries and the Government itself, secure all of the men for outside work of a similar nature. It has been the experience of the roads in past years that those companies which have started work early have had their pick of the men and have secured more efficient forces than those which organize their forces later. This year the shortage may be expected to be even greater than last year because of the abnormal demand in the shipyards, and in the war industries and the further effect of the draft, etc.

Equally serious is the situation regarding materials. In normal years the roads have ordered their rails during the early winter for delivery in the spring. Following the outbreak of the war, orders were placed still further in advance. Since the government has taken over the roads almost no rails have been ordered and they are entering the spring with little prospect of securing any in the near future. The only possible result of such conditions will be a large reduction in the amount of work which can be completed and a marked increase in the cost of that which is done.

The standards to which the roads are to be maintained is also a source of some concern. In his proclamation announcing his decision to take over the railways the President stated that "The railway properties will be maintained in as good repair and as complete equipment as when taken over by the government." In contrast with this statement the director general has asked the roads for information showing the minimum number of gross tons of rails required. While the demands for steel and other materials for war purposes are such as to require that no greater inroads be made upon the output of these materials than is necessary, it should be borne in mind that this will not insure the maintenance of the properties to the standards to which they have been maintained in past years and that any reductions in rails or other materials are not savings in the end but merely deferred maintenance which must be made good. The traffic of the country demands that the roads be maintained in proper condition. This in turn requires that they be permitted to secure not less than their minimum requirements of materials and that they may be permitted to undertake their work at once; for, measured in terms of work accomplished, a day now is equivalent to a week in the winter. There is reason, fortunately, for believing the director general contemplates a more generous maintenance policy than the request for information as to minimum requirements indicates; but it will be very difficult to make up for the loss of time that is occurring in getting started on needed work.

New Books

Railroad Structures and Estimates. By J. W. Orrock, principal assistant engineer, Canadian Pacific, Montreal, Que. 580 pages. 272 illustrations. 8½ in. by 5½ in. Bound in leather. Published by John Wiley & Sons, Inc., New York Price, $5.

Cost figures have assumed a new importance since the inauguration of the federal valuation work, for it has caused many men to recognize the dearth of information of this character today. For this reason this book is particularly timely and valuable. The objection is frequently raised that no cost data can be used safely without a full knowledge of the conditions surrounding its collection. This is true in large measure, but even without this complete detail it is of much assistance to the estimating and construction engineer if used intelligently.

The first edition of this book was published in 1909. In the second edition the contents have been rearranged to conform with the classification of accounts prescribed by the Interstate Commerce Commission in 1914. A large amount of new material has also been added.

The book is limited to railway work and gives in detail data regarding the cost of the more unusual as well as the common problems encountered in such work. It is, therefore, of particular value to railway men. Liberal use has been made of information published in the technical magazines in the preparation of this volume. The book is divided into 20 chapters, typical headings of which include Track Materials and Estimates; Structural Materials and Estimates; Bridges, Trestles and Culverts; Ties; Rail; Other Track Materials; Track Laying and Surfacing; Stations and Other Buildings and Shops and Engine Houses.

Railway Business Association Broadens Activities

Invites All the Supply Interests to a Conference. Its Leaders See Great Possibilities Ahead

ACTIVITIES APPROPRIATE TO CHANGED CONDITIONS, and primarily aimed to serve the business interests of all those who furnish necessaries to railroads, are recommended for the Railway Business Association in a unanimous report by its General Executive Committee. This plan for future work is addressed alike to members and those not enrolled but believed to have a common stake with members. It accompanies an invitation to attend the annual convention at the La Salle hotel, Chicago, on April 8, and participate in the discussion of purposes and methods. These proposals have been the subject of protracted conferences. They respond to expressions from many of the business men affected. Discussion from the convention floor is earnestly urged. The report of the General Executive Committee is distributed in advance in order that those attending may come to the meeting prepared to express their views. The report follows:

Events have given to those who deal in railway necessaries a duty to the country and to ourselves which calls for more vigorous and far-reaching organized activity than any which we have undertaken in the past.

Successful prosecution of the war requires that American railroads shall be promptly rehabilitated and their facilities maintained and adequately increased. When war shall have ceased a portentous problem will remain. Full enjoyment of the liberties for which we are fighting requires national prosperity. National prosperity depends upon a robust railway system. The impairment of transportation vitality now disclosed is chronic. Its causes must be eradicated. America must have a railway system adequate for her great destiny.

Public Opinion

Determination of policy now and after the war rests with the government. What that policy shall be will depend upon public opinion. Public opinion will be intelligent in proportion to the thoroughness with which exact knowledge is diffused among the citizens. While the railroad men because they are operating under government direction may not be in position to voice their views freely to the public, the manufacturers of and dealers in equipment, material and supplies are entirely free to make inquiry and publication of the results on any aspect which they view as affecting the national interest or their own.

We have never known business men in this field to manifest so great an anxiety or so thoroughgoing a desire as now for concerted action.

The work falls under two general heads:

First:—*Development of policy and practice by the Director General of Railroads affecting construction and maintenance of material, equipment, supplies and structures during the war.*

We recommend a systematic participation by us in public discussion of the problem so far as our occupation gives us special competency to speak.

Second:—*Reconstitution of the railway system after the war.*

We recommend that our industry from now on seek the cooperation and co-ordination of other organizations in the endeavor to promote national concurrence in the general principles which should govern railway legislation upon the conclusion of peace.

Standardization

Decisions by the director general or administrative application of policies by his deputies during the war may profoundly affect manufacturers of railway goods. The present director general has indicated a hospitable disposition toward devices not yet in use. He has also declared that for upkeep and repair, use will be made of the appliances for which existing vehicles were designed.

The purpose to improve car and locomotive design will not only afford the country for the war the most advanced transportation instruments obtainable, but, together with use of existing established devices, will carry through the war into time of peace the occupation of promoting progress in the art of transportation through invention and manufacture.

Such business units have been built up by inventive genius, adequate management and fair dealing; they are established upon the practical demonstration of actual use. To exclude a given maker of appliances for the period of the war with the aim of standardization might signify his permanent disappearance as an industrial factor. It is impossible to foresee in what shapes standardization may be advocated or what criteria may be proposed in sanctioning interchangeable appliances as permitted to bid upon new construction. We do not know what changes in personnel, organization or policy may occur. With constant vigilance we must warn the public and officials against setting up unwise and harmful precedents.

Ultimately what the country has to fear and what manufacturers should resist is overstandardization, which discourages invention and stifles enterprise and progress.

It is our duty to observe systematically the course of official thought and action and to give those in authority the benefit of our knowledge and opinions and likewise the benefit of public opinion as gathered by us upon the questions involved.

Railways After the War

For development of national concurrence in the general principles which should govern legislation affecting railroads after the war, we recommend that the railway supply craft and other businesses allied thereto shall undertake whatever labor may be necessary. Those whose ideas differ widely from our own are not waiting for the declaration of peace. They are carrying on an insistent propaganda. Individuals and organizations in their conduct of that propaganda have increasingly had the aid of numerous and powerful publications.

The sooner our own proposals for railway legislation are developed and arguments presented in their support the more open the public mind will be for unbiased consideration of our views.

Attacks on the Managers

Recently certain railway labor leaders, public officials and others have made statements which if not refuted would deprive the railway managers of the public confidence.

In the highest quarters testimony is abundant to the splendid loyalty and efficiency of American railway officials. With an unprecedented burden of responsibility and difficulty they have wrought wondrously well. Not merely in fairness to them, but in the interest of temperate discussion and sound public thought upon the general railway problem we should place the facts before the public and maintain in the minds of the citizens that esteem for the railway managers as a whole which after many years of acrimonious controversy had at the moment of this assault upon them become happily general.

Still another reason dictates an immediate beginning. Problems will crowd upon Congress in great number and

perplexity after the war. Those will be first dealt with upon which there is the most obvious public concurrence. The period of uncertainty pending railway legislation will inevitably involve a postponement of anything like comprehensive projects for railway construction. The shorter this delay the sooner the new railway system can come into the market with purchases to take the place of munition and other war-supply manufacture. This will tend to stabilize employment in the period of transition from war to peace. Hence it is of great material importance that discussion of principles for an ultimate solution of the railway problem shall have proceeded as far as possible before the cessation of hostilities.

Your committee has endeavored to define certain general principles which it believes you will be ready to espouse.

Individual Initiative

Foremost we place the preservation of individual initiative in the investment of capital and in management.

By this we mean reliance upon the judgment of the investing public in projecting enterprises of construction or improvement. We mean responsibility of the owners or their representatives for selection of operating executives. We mean maintenance in railroading of a career outside the government in which the poor boy, as in the past, can begin with nothing and rise to the top by aid of no influence except his own ability and efforts. We mean the preservation of government regulation—regulation in which the citizen can appeal, not from one government official to another, but from an official outside the government to the government itself.

Competition as Well as Co-operation

Second stands the organization of railways into a number of independent corporate units.

Profound changes have been made possible by the war. These may effect the corporate structure and the relations of one railroad corporation to another. Whatever may come we should, in our judgment, urge that the organism be so worked out as to preserve a healthful equilibrium between co-operation and competition.

Here again it is appropriate to mention competition between manufacturers of railway appliances.

The crux of our peculiar problem is the question: With whom shall the fate of the inventor or developer of inventions rest? If the number of railroad units were reduced or if railroad units adopted group provision and maintenance this would involve partial centralization, but to concentrate altogether would entail an extreme narrowing down of the number of minds whose discretion consideration and experiment lay and from one of whom appeal could be had to another. It may be apprehended that complete centralization would in time be administered by officers who would come to have no personal and compelling motive for hospitality toward improvement. There is always a tendency to overburden the government agencies with detail. To seek relief from this they might fall into the error of a too rigid standardization.

Adequacy the Aim

A third principle is for the federal government to adopt as the primary aim of regulation adequacy of facilities through attraction of capital.

What we have to create is a public sentiment which will result in a governmental policy to promote and not to restrict construction and upkeep of railways. If we are to have a prosperous country and that is to say a progressive transportation system, we must face squarely the fact that our country can have such a system, efficient and expanding to meet the nation's necessities, only by permitting such earnings as will meet railway disbursements, both those essential to adequate operation and those imposed by government, and provide in addition a surplus as the basis of railway credit.

Broader Associated Effort

As dealers in railway necessaries we should, in our associated capacity, broaden and strengthen our facilities for making reports to the public from our point of view upon current events in this field and for promoting in the several communities discussion of current proposals affecting transportation.

We should adhere sedulously to the declaration that as a group we "shall have no part in party politics." Now, as from the beginning, we should court the sunlight. We believe we need leave undone nothing that ought to be done if we seek the co-operation of those agencies only which are committed to the most open methods and the most immaculate conduct.

Trade Acceptances and Exports

Supplementary to the rehabilitation, maintenance and enlargement of the railroads during the war and the development of public purposes for legislation affecting railways after the war there are certain other activities to which we invite attention.

Trade acceptances, common abroad, but not until recently introduced here, have been suggested as a means to railway supply manufacturers of reducing their cost of doing business by getting immediate negotiability at the bank for an invoice attested by the purchaser as correct and bearing a contractual due date. Discussion of this subject as it applies to our industry has been placed on the program for the association convention.

Opportunities for trade with railways and other utilities in foreign countries, rendered more obvious by the temporary trade isolation of the Central European powers, have led many to turn their thoughts in that direction.

The investment interest of American citizens in foreign railways has substantially increased as a result of the war and otherwise. Federal sanction of co-operation between competitors in foreign export trade is assured. The association office is engaged in a study of the possibilities of service to our members in connection with exports. A report upon the subject will be presented at the convention. We recommend that delegates be accredited to the National Foreign Trade Council and that steps be taken to encourage participation in that Council by members of this craft.

Our Opportunity

No industrial group ever had a more splendid opportunity. Our special motive we lay bare without apology—that motive is our own prosperity and the prosperity of those who look to us for the steady and profitable employment of their labor and their savings in these industries. The work of the Railway Business Association in the past has brought it public esteem and confidence, while fortifying it with experience and facilities, connections and, above all, mutual acquaintance and the habit of team work. We can rejoice as we proclaim that what we urge is patriotic in time of war and patriotic in time of peace.

PERU'S RAIL PROJECT TO REACH COAL AT HIGH ALTITUDE.—The importance of the project to build a 75-kilometer (46.6 miles) railway line in Peru, from Huancayo to the coal deposits at Jatunhuasi, on the eastern side of the Andes, is discussed in articles which have been published in the West Coast Leader. The railroad to the coal mine will cost approximately $1,500,000 which money has been guaranteed by the Italian bank at Lima. This new line will join the main line of the Ferrocarril Central del Peru, probably at kilometer 343, and will be of standard gage. The haul from the coal mines to the seacoast will be 418 kilometers (300 miles). The contract is not let, but there is every probability that the Peruvian Corporation will take it and operate the road after its construction.

Winter Temperatures and Locomotive Capacity

A Study of the Relation Between Decreasing Temperature and Increasing Motive Power Requirements

By W. L. Bean
Assistant to the General Mechanical Superintendent, New York, New Haven & Hartford

THE UNUSUALLY SEVERE TEMPERATURES of the winter of 1917-18 added tremendously to the difficulties of railroad operation and prompted the making of a study, the object of which was to establish a measure of the relative effect of the extraordinary weather as compared with that of other years in terms of decreased effectiveness of steam locomotives of the New York, New Haven & Hartford in handling traffic.

A drop in temperature decreases the capacity of the steam locomotive boiler and also greatly increases train resistance; in fact the first factor is of much less importance than the latter. The question as considered in this article is principally that of increased demands of power to move cars whose journal friction increases as the temperature falls, because of the increase in the viscosity of the lubricant.

Operating records in electric freight service between Harlem River terminals and New Haven, a distance of approximately 70 miles, where undulating grades of 0.6 of 1 per cent rule, with considerable curvature, afforded an opportunity to consider the problem on the basis of increased power consumed by electric locomotives in winter as compared with summer. The average kilo-watt hours per 1,000 gross ton-miles in freight service were plotted for each month for nearly two years as shown in Fig. 1 and the monthly mean temperature at New Haven, Conn., as recorded by the United States Weather Bureau, was also plotted. Maximum power consumption and minimum temperatures, and vice versa, register quite accurately, as would be expected. In the year 1916 the maximum and minimum power rates were both higher than in the year 1917, and explanation was sought by plotting.

(a) *Average revenue tons per revenue car mile.*—This shows a fairly uniform increase during the two-year period and would account in part for the lower power consumption in 1917.

(b) *Average wind velocity in miles per hour, all directions.*—There was most wind in March, 1916, when the power consumption rate was highest, and least in the summer of 1917.

(c) *Precipitation.*—The precipitation, especially the snow-fall in February and March, 1916, was much heavier than in 1917.

Each of these factors account for a heavier power consumption rate in the year 1916 than in 1917, there being no change of importance in electric equipment or operating practices.

Temperature and Power Consumption Ranges

In the endeavor to secure values of use in estimating the decreased effectiveness of steam locomotives as a result of cold weather, the average of the minimum power requirements in the two years was subtracted from the average of the maximum consumptions and the "power range" was found to be 8.45 kw. hours. This amounted to 31.1 per cent of the average minimum or summer power consumption and was assumed to represent the excess power required to create 1,000 gross ton miles in mid-winter versus that necessary in mid-summer. Similarly the "temperature range" between average maximum and average minimum was found to be 47.5 deg. Fahrenheit. Dividing the "power range" by the "temperature range" it is found that for each degree of temperature change the demand for power increases 0.65 per cent.

The above discussion and result has been possible only

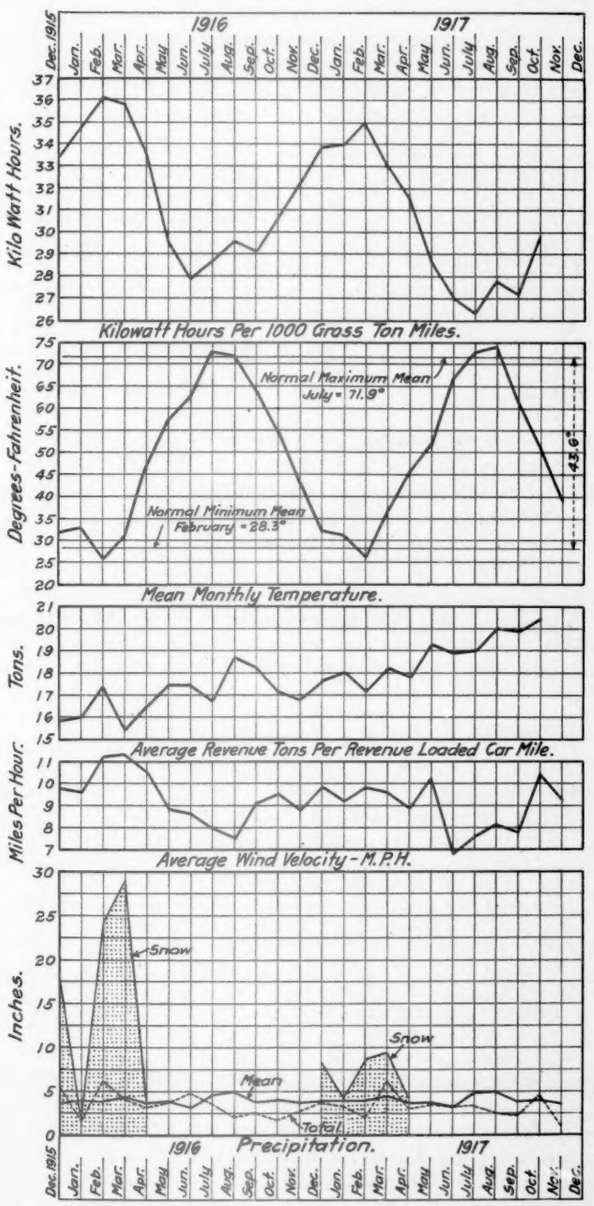


Fig. 1—Relation Between Electric Power Consumed and Weather Conditions

because of power consumption records kept for electric locomotives, but it is felt that the factor 0.65 per cent may be applied to steam locomotive service because there is no great difference in the heat losses and engine friction of steam

and electric locomotives considered in percentage of maximum capacity.

Furthermore, heat losses in steam locomotives causing reduction in capacity in winter versus summer are practically offset for the purposes of this study by the consumption of current in heating cabs of electric locomotives. This use requires approximately three per cent of the total electric power used on a trip.

Concerning heat losses and friction in steam locomotives, Messrs. Schmidt and Marquis in Bulletin No. 59 of the University of Illinois, state:

"Taking all these facts into consideration, it seems likely

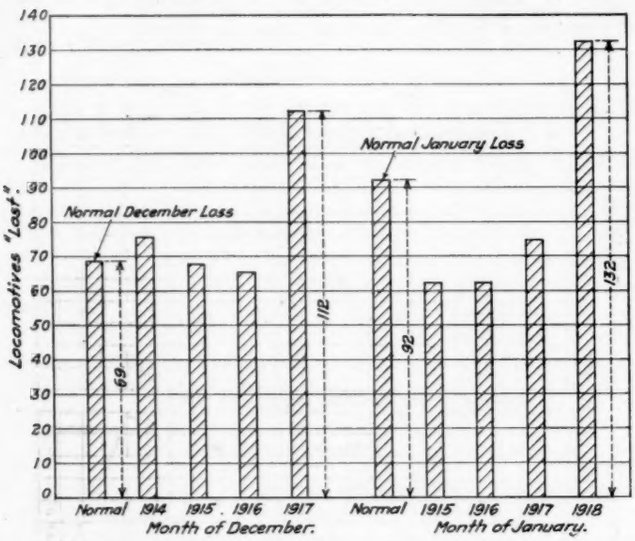


Fig. 2—Estimated Effect of Winter Temperatures on Train Resistance Stated in Terms of Loss of Use of Locomotives

that cold weather does not greatly reduce the tractive effort of locomotives, and that, consequently, it does not necessitate radical reductions in rating in so far as its effect upon the locomotive itself is concerned. Probably a reduction in rating of four or five per cent, even with air temperatures as low as 0 degrees F., is sufficient to allow for the reduced tractive effort of the locomotive."

Considering all these things, it appears reasonable to apply to steam operation under the track characteristics named the factor 0.65 per cent per degree of temperature.

Steam locomotives are at their greatest disadvantage in starting trains in winter, whereas electric locomotive motors are favored in winter versus summer, because they can be overloaded for longer periods without overheating. Hence, electric engines can exert their maximum tractive effort over longer periods in the first part of their trips during which time journals are warming up and train resistance is therefore decreasing.

Adjustments in Tonnage Ratings to Suit Temperatures

Reductions in tonnage ratings because of temperature changes are rarely made above 45 degrees F. Starting at that point and applying the factor 0.65 per cent, a table of tonnage reductions can be constructed which would appear to suit conditions obtaining on track of the characteristics of that portion of the New Haven System before referred to.

Temperature Range	Tonnage Reduction
45 to 35 degrees	6.5 per cent
35 to 25 degrees	13.0 per cent
25 to 15 degrees	19.5 per cent
15 to 5 degrees	26.0 per cent
5 to —5 degrees	32.5 per cent
—5 to —15 degrees	39.0 per cent
—15 to —25 degrees	45.5 per cent

The above applies to medium and slow freight.

Effect of Temperatures on Available Engine Power

The foregoing data may be used in connection with current weather conditions to measure the effect of temperature at any particular time in increasing the demands on engines in handling traffic and further on in the article a representation is made of this loss in terms of entire engines.

The daily mean temperature at New Haven, Conn., for December, based on 45 years' weather bureau records, is 31.8 degrees. The normal daily mean temperature for January is 27.3 degrees. The actual mean temperatures for those months for four recent years are as follows:

December		January	
1914	30.4 degrees	1915	33.0 degrees
1915	32.0 degrees	1916	33.0 degrees
1916	32.4 degrees	1917	30.6 degrees
1917	23.4 degrees	1918	19.6 degrees

Therefore:

December, 1914, was 1.4 degrees below normal.
December, 1915, was .2 degrees above normal.
December, 1916, was .6 degrees above normal.
December, 1917, was 8.4 degrees below normal.
January, 1915, was 5.7 degrees above normal.
January, 1916, was 5.7 degrees above normal.
January, 1917, was 3.3 degrees above normal.
January, 1918, was 7.7 degrees below normal.

From the above, on the basis of 0.65 per cent greater power being required to move cars for each degree of temperature drop, excess power requirements in last December and January as compared with those months in the three immediately preceding years were as follows:

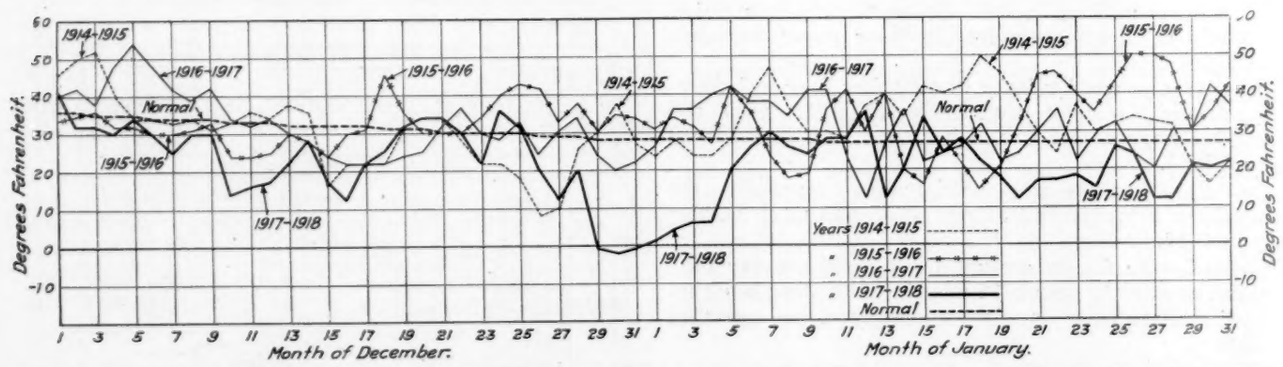


Fig. 3—Temperature Variations at New Haven, Conn., for the Months of December and January for the Past Four Years

December, 1917

4.55 per cent greater than in December, 1914
5.55 per cent greater than in December, 1915
5.95 per cent greater than in December, 1916

January, 1918

8.71 per cent greater than in January, 1915
8.71 per cent greater than in January, 1916
7.15 per cent greater than in January, 1917

Assuming 800 locomotives normally in service, the result of such handicap as stated above measured in the number

of locomotives necessary to make up the increased demand for power on account of low temperature, was as follows:

December, 1917
36.4 engines more than in 1914
44.4 engines more than in 1915
47.6 engines more than in 1916

January, 1918
69.7 engines more than in 1915
69.7 engines more than in 1916
57.2 engines more than in 1917

Fig. 2 indicates the number of engines which would have to be added in a normal December and in a normal January to make up the loss of engines due to winter temperatures as compared with summer. Also the losses in each of the two months in the three preceding years are shown.

It will be noted that December weather in 1914, 1915 and 1916 ran fairly close to normal but in 1917 was excessively low with the result that instead of losing a normal of 68.6 engines, the equivalent loss was 112 engines, or in other words, the December loss this year was 63 per cent greater than the normal December loss.

On the other hand, it will be noted that the losses in January of the years 1915, 1916 and 1917 were below normal because the temperatures in each of those months were above normal.

Curves showing the maximum, minimum and mean temperatures for the past four years are shown in Fig. 3.

On account of the abnormally high temperatures in January in previous years, the loss of engines in those years averaged about 66.5 as compared with a normal loss of 92.0 and an abnormal loss in January, 1918, of 132.1; therefore, the loss this season was about 43 per cent greater than in a normal January and about 98 per cent greater than the average of the three preceding Januaries.

Any consideration of the foregoing estimates should, of course, take fully into account that no effect is considered other than that of low temperatures in causing increased resistance of trains, as regards friction in bearings, and allowance for heat losses in steam locomotives. Those factors only in the slowing up of train movements are to be connected with this study. Greater breakage of locomotive and car parts, as well as rails; delays caused by frozen parts; accumulations of ice; obstruction of vision by steam; and the effect of cold on working forces are, of course, not taken into account.

INCREASED PAY FOR IRISH RAILWAYMEN.—The recent government award of 12½ per cent increase in wages to time workers and 7½ per cent increase to piece-workers engaged on the English railways has been made applicable to all men engaged in the repair, construction and maintenance of locomotives and cars and locomotive sheds and shops in Ireland.

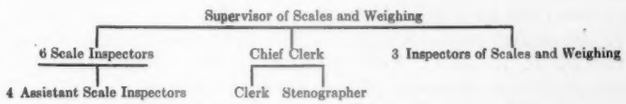
AMERICAN-RUSSIAN TRADE IN 1917.—The total trade between the United States and Russia during the calendar year 1917 amounted to $438,000,000, according to a statement issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce. This total represents a decrease of $39,000,000 from the record figures of 1916, but the decrease was in the trade with Asiatic Russia and was doubtless due to the congestion and the import restrictions at Vladivostok. Locomotives worth $11,281,000 and railway-stock material valued at $5,865,000 were sent to European and Asiatic Russia together in 1917 as against $3,727,000 and $4,407,000, respectively, in the preceding year. There was a marked decline, however, in exports of freight cars, which were valued in 1916 at $4,112,000 for European Russia and $7,994,000 for Asiatic Russia, and in 1917 at only $763,000 for European Russia and $1,264,000 for Asiatic Russia. This trade in railway equipment has originated since the war started.

Baltimore & Ohio Weighing Bureau*

By L. D. Davis
Supervisor of Scales and Weighing.

THE ORGANIZATION of the department in the beginning consisted of a chief scale inspector reporting to the chief engineer maintenance of way, with the scale inspectors reporting to the district engineers of maintenance of way. Jurisdiction was extended over the Baltimore & Ohio Southwestern in 1910, and in January, 1911, the chief scale inspector was appointed supervisor of scales and weighing, reporting to the general manager, at which time his supervision was extended to cover all matters pertaining to scales and weighing. Since April, 1912, the bureau has been under the transportation department. In August, 1912, jurisdiction was extended over the Cincinnati, Hamilton & Dayton. Its present organization is as follows:

A scale shop at Martinsburg, employing a foreman and from two to three mechanics, is under the maintenance of way department, but work is handled in accordance with suggestions of the weighing bureau.



The Organization of the B. & O. Weighing Bureau

The number of different type of scales in use and period for testing is shown below:

Number of scales		Increase since 1910	Schedule for testing
144	Track scales	18*	Every sixty days
255	Private track scales	20	Every sixty days
537	Motor truck, stock and depot scales	195	Every six months
1,500	Portable and other scales	200	Once every year

*Decrease. The reduction in the number of track scales is due to the removal of eleven from coal piers, because of changed operating conditions, and concentration of weighing.

The annual expenditure for new scales, the renewal and maintenance of old scales, and bureau supervision, beginning with 1909 is as follows:

Year	Baltimore & Ohio	Cincinnati Hamilton & Dayton
1909	$28,000	.....
1910	69,471	.....
1911	139,837	.....
1912	161,967	.....
1913	67,986	$12,000
1914	69,549	17,232
1915	41,306	34,972
1916	83,355	3,165
	$661,471	$67,369

The greater part of this expenditure has been for new track scales of improved design and installation. Fifty-two of the improved type scales have been installed, on which 76 per cent of cars are weighed.

The proper design and installation of scales is hardly of more importance than their proper cleaning and maintenance.

It should be considered that in a track scale there are 15 levers of a fixed ratio, coupled together to record a weight, and it is absolutely essential that these levers be rigidly supported, pivots kept sharp and unobstructed by dirt or rust. Measures taken to prevent rust have resulted in a material increase in the life of scales.

The Older Type of Installation

Prior to 1909 only one track scale was set on steel, all others being on timber. In 70 of these the load was supported and distributed to the levers through 12 in. by 18 in. wood stringers. At the present time all but 20 scales are set directly on concrete, and in all of them the load is

*From the Baltimore & Ohio Employees' Magazine for January, 1918.

supported by steel "I" beams. Four of those on timber will be renewed on concrete this year and two abandoned. Every track scale in use at the beginning of 1909 has either been abandoned, renewed or replaced, some of them having been renewed more than once.

The first of the newer type scales was installed at Cumberland, Md., in January, 1910, and there have passed over it approximately 900,000 cars or 35,000,000 tons of freight, resulting in freight revenue of about fifty million dollars, before it was necessary to renew any of the scale parts, and then only the eight main levers were replaced in November, 1915. In that period of nearly six years, the scale was tested 34 times with a scale test car and it was found out of adjustment but seven times, the largest error found being 90 lb. The older type scales under similar service lasted without renewal about six months.

Latest Design in Track Scales

In order to accommodate longer and heavier cars and to allow for a possible increase in these respects, the design in use 1910 to 1917 has been superseded and in the future 60 ft. scales will be installed at motion-weighing points, and 50 ft. scales at spot-weighing points. The latest type is designed to support 50 per cent of the capacity on each section, while the type now in use was designed for a uniformly distributed load of 300,000 lb.

It is logical that this type should be adopted since half the weight of a loaded car is concentrated on each truck which passess successively over each section of the scale, and when cars of equal weight are coupled, the weight of an entire car is concentrated on a comparatively short space. Parts of the 50 ft. and 60 ft. scales of the latest type will be interchangeable except as regards the four extension levers, which are necessarily of different length. Sixty-foot scales have been installed at Newark, at Connellsville and at Cleveland.

The importance of installing the best type of scale obtainable may be realized when it is considered that if the track scale at one large weighing point were weighing one pound light in each thousand, the loss in freight revenue would approximate $50 a day.

Track scales at nearly all motion-weighing points are equipped with automatic recording attachments. Instructions require that the car shall be entirely on the scales three seconds for weighing and that the speed shall not exceed four miles an hour.

The development and extended use of motor trucks, with about 80 per cent of the load concentrated on the rear axle, has necessitated an improvement of design of scales on which to weigh them. This type has been installed at New York, Chicago, Cincinnati and Olney. The scale is 20 tons capacity with a platform 22 ft. long by 9 ft. wide, and equipped with a full capacity single beam with ball bearing poise. The installation is entirely of concrete and steel, even to the concrete deck.

Depot scales have been improved, both as to design and strength. While formerly designed with truss rods, the rods have been eliminated and levers of sufficient strength in themselves to support the load are now used. The suspension platform type is also used instead of the direct bearing type.

A number of depot scales have been installed at points where only portable scales were in use, and this has resulted in a larger amount of accurate weighing and the consequent increase in revenue.

Test Cars

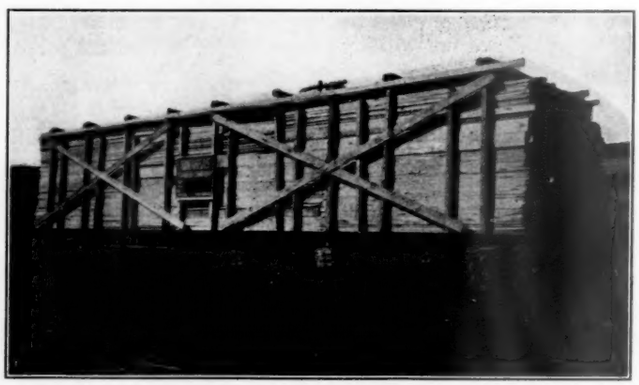
Test cars are sealed after each test trip, or about five times annually. These test cars are spotted consecutively over each section of a track scale, and if any adjustments are necessary, these are made by moving nose irons on the end of levers, thereby changing their ratio to such an extent as to put the scale in adjustment.

Test cars have also been improved in design. There is under construction a heavier car weighing 80,000 lb. Two large castings weighing 33,000 lb. each make up the greater part of the weight. Every unnecessary part has been eliminated from the design, the change of which might result in a change of weight. All parts have been designed, as far as possible, to avoid holding dirt. Journals are equipped with roller bearings to facilitate movement by the scale inspector with push bar, and to avoid the frequent necessity of sponging and packing journal boxes, which frequently results in a change of weight.

Worn and broken scales are sent to the Martinsburg shop. The old pivots are sharpened, if possible, or replaced by new ones, and the fulcrum distances gaged as accurately as possible with special gages after which pivots are hardened, tried with a gage, and ground again if necessary. The levers are then put on sealing horses. If the gaging has been done accurately, which is extremely difficult, a certain weight suspended from the load pivot will balance a predetermined weight on the sealing beam. If it does not, it is then necessary to grind again the pivots until the weights balance. As each lever is sealed in the shop with weights to transmit its proportion of the load accurately, the levers, if properly coupled together and supported will, in unison, accurately transmit the weight of the entire load and the scale give correct weights. In this way loss of revenue from use and wear is reduced to a minimum.

A Record Carload of Lumber

SINCE THE ENTRANCE of the United States in the war car conservation has come to be recognized as a patriotic duty and many shippers have made enviable loading records. The illustration shows a car of yellow pine lumber that was shipped by the Arkansas Lumber Company on February 12 from Cloquet, Ark., to Camp Pike, Ark.,



Car of Lumber Loaded to 110 Per Cent of Marked Capacity

via the Warren & Ouachita Valley and the Missouri Pacific. The car contained 60,000 ft. b. m. of lumber and weighed 150,000 lb., or 110 per cent of the marked capacity of the car, which was 140,000 lb.

IRISH RAILWAY TRAVELING RECORD.—A record for Irish railway traveling was accomplished recently on the Great Northern Railway, says the London Times. Lord Pirrie, in a special train, went from Belfast to Dublin, a distance of 115 miles, in 107 minutes, the return journey being accomplished in 109 minutes.

Selling to Railroads Under Government Control

Orders Placed Will Be Large, and Changes in Standards and Purchasing Methods Less Than Have Been Feared

THREE QUESTIONS regarding the relations between the railways and the railway equipment and supply concerns under goverment control have been much mooted recently. These are, first, how large are the purchases of the railways likely to be; second, who is going to determine what they shall buy; and, third, who is going to do the actual buying? Pretty definite answers may now be made to these questions, as a result of public announcements and quasi-public assurances which have come from the railroad administration in Washington.

Will Purchases Increase or Decrease?

As to the magnitude of the purchases to be made under government control, there is reason for believing that they will show a large increase over those made in recent years. If the properties are to be put and kept in condition to handle more satisfactorily both the commercial and the war business of the country, the expenditures for both maintenance and additional facilities must be substantially increased.

The expenditures for maintenance of way and maintenance of equipment combined amounted in the fiscal year 1916 to $992,000,000 in the next twelve months to about $1,100,000,000. As near as can be estimated, 40 per cent, or about $400,000,000, of this was spent for equipment, materials and supplies and the rest for labor. The expenditures for maintenance probably ought to be increased at least $150,000,000 annually, which would involve an increase of expenditures for things used in maintenance of way and equipment of, say, $60,000,000.

New investment in road and equipment—that is, the outlay charged to capital account—was less than $280,000,000 in 1916, the latest year for which complete figures are available. Six to eight years ago the annual new investment was about $750,000,000 annually; and in order to secure anything approaching a normal increase of facilities, the annual new investment at present, with the wages and prices now prevalent, ought to be $1,000,000,000. Suppose, however, it should be only $750,000,000, which at present wages and prices would increase facilities only two times as much as they were increased annually in 1910, 1911 and 1912. About 40 per cent of this also would be outlay for equipment, materials and supplies. This would make a total annual outlay for equipment, materials and supplies used in maintaining and increasing facilities of about $800,000,000. Expenditures for equipment, materials and supplies during the last four years, when additions to facilities have been smaller than for many years and great economy has been practiced in maintenance, probably have averaged less than $600,000,000 a year. Therefore, if under government control the railways are to be adequately maintained, and any considerable stimulus is to be given to the expansion of their facilities, the expenditures for equipment, materials and supplies will have to be increased by about $200,000,000 a year.

There is much reason for believing the railroad administration contemplates increases in expenditures on a large scale. An official statement was issued last week announcing the organization of the new purchasing department of the administration. In this it was stated that purchases "will amount to between $1,000,000,000 and $2,000,000,000 per annum." This estimate includes the outlay for fuel, which is not included in the estimates of expenditures for equipment, materials and supplies given above. The annual outlay of the railways for fuel is now about $400,000,000. An expenditure of $400,000,000 for fuel and of $800,000,000 for equipment, material and supplies would make total purchases amount in a year to only $1,200,000,000, which is but little larger than the *minimum* figure mentioned by the railroad administration.

Needless to say, these estimates of both past and prospective expenditures for equipment and supplies are but rough approximations; but probably they are as near correct as any general estimates that can now be made. From all indications it may be predicted that the volume of the business which the equipment and supply companies will soon be doing will be more satisfactory than it has been for some years.

Who Will Determine What the Railways Shall Buy?

Who is going to determine what the railways shall buy? The announcement regarding the organization of the division of finance and purchases, of which John Skelton Williams is the director, states there is to be a central purchasing committee at Washington and regional purchasing committees associated with each of the regional directors. All purchases of locomotives, cars and steel rails will be made through the office of the director of purchases in Washington. But this does not mean that the exact locomotives, cars and rails which shall be bought will be determined by the permanent staff in Washington. A committee of railway mechanical officers was called for its recommendations regarding the kinds of locomotives and cars that should be ordered and as to how they should be equipped. Doubtless before rail orders are placed a committee of chief engineers of the railways will similarly be called on to consider the weight, specifications and methods of manufacture of the rail to be ordered. In other words, under government control, as under private control, the experienced technical officers of the railways in all parts of the country will determine what kind of locomotives, cars and rail shall be bought. This was not clear when the talk about general standardization was begun a few weeks ago. It seems to be definitely settled now. Furthermore, even when standards once have been used, it does not follow that when additional equipment is subsequently ordered exactly the same standards will be adhered to.

As to other kinds of materials and supplies, they are to be bought by the purchasing officers of the individual railways acting under the supervision of the regional purchasing committees. The technical officers have in the past been largely relied on by the purchasing officers of the individual lines to indicate what supplies should be bought for them. They will, of course, continue to do likewise under the new system. In other words, the same trained and experienced men who have had charge of the maintenance and development of the physical properties of the railways in the past will continue to have charge of them. This means that they will be, as they have been heretofore, the men to whom the selling departments of the supply companies will have mainly to address themselves in order to market the things that they make and handle.

But who is going to do the actual buying of things other than rolling stock and rail? In the main it is to be done, as it has been in the past, by the purchasing departments of the various roads. There will, however, be introduced some new elements in the relations between the railways and the supply companies. All contracts for supplies for periods

of six months or longer must be submitted before being made to the regional purchasing committees, and "information as to the prices paid for all supplies will be furnished monthly by all roads to the regional purchasing committees, so that the prices paid by each road for all articles may be carefully checked." The purpose of this requirement is obvious. It is intended to bring about uniformity in the prices paid by the different roads for articles of similar quality handled under similar conditions.

The Co-Ordination of Purchases

The announcement regarding the plan for the division of purchases says that purchases of supplies needed in the current operations will be made for "time being" through the purchasing departments of individual roads. It adds "the regional purchasing committees will address themselves to consideration of the opportunities for standardizing and consolidating purchases of every kind that may admit of such treatment, with a view to increasing efficiency and economy." This indicates that there will be increasing standardization of supplies and increasing centralization of purchases as time goes on.

There is no reason now, however, for believing that in the long run standardization of supplies and consolidation of purchases will be carried as far as there seemed reason to fear when the talk about these policies began. It may be confidently predicted that even though an attempt to go a long way with standardization and centralization were made it would later be abandoned. Both the Ordnance Department and the Red Cross have tried highly centralized organizations, and are abandoning them in favor of decentralized organizations, because they found the centralized organizations were top-heavy, cumbersome and inefficient.

The railways of the United States spread over such an immense area, operate under such diverse conditions, and buy such enormous quantities of equipment and supplies that it would be easy to standardize and centralize purchases for them so much as to cause waste, delays and demoralization which could soon force the Railroad Administration to decentralize.

Both the official and unofficial statements of officers of the Railroad Administration indicate that the policy they are trying to work out is one which will co-ordinate rather than merely centralize purchases. While, therefore, purchasing methods are going to undergo important changes, and it will be necessary for railway equipment and supply companies to modify their selling methods accordingly, there is no reason for believing that a supply dealer who can convince the technical and purchasing officers of a road that they ought to buy his goods, and buy them at prices which will yield a reasonable profit, will have much more difficulty in selling them to that road than he has had in the past.

Supply concerns will have to carry on negotiations in many cases now not only with the officers of individual lines, but also with the regional purchasing committees and with the purchasing department in the director general's office in Washington. But in the past in the case of large railway systems they often have had to convince both the technical officers away from general headquarters and also the technical and purchasing officers at the general headquarters of the railways in Chicago, New York and other large railway centers.

Trying Out New Devices

One important question which has been raised has been as to the influence which government control will have on the selling of new and experimental devices to railroads. The *Railway Age* has raised this question in its editorial columns and pointed out that rigid standardization would stop progress by preventing the introduction of new and improved devices. This matter was brought directly to the attention of Director General McAdoo in the able letter which was sent to him under date of February 4 by George A. Post, president of the Railway Business Association, and which was published in our issue for March 1. Officials of the railroad administration since then have sought to make clear that it is their intention even under the conditions of war to promote rather than retard the technical development of the railroads, and in accordance with this policy to keep the door open for giving full and fair trial to new and improved devices.

The development of the organization and policy of the Railroad Administration naturally is being followed with anxious interest by everybody who is directly affected by the management and operation of the railways, and this includes not only those who are directly connected with the roads but also all those who manufacture and sell equipment, materials and supplies to them, and all those who are large users of their services. No class of concerns will be more vitally affected by the policy of the railroad administration than the railway equipment and supply concerns because they have invested a vast amount of capital and employ hundreds of thousands of men for the purpose of doing business with the railways. Their plants are located in every part of the United States, and anything that was done which might seriously hurt them or any large part of them would have serious effects on the industry and commerce of many communities, large and small. Therefore, it is not only in their interest, but in the interest of the country generally, that the various organizations which represent the railway supply interests and especially the Railway Business Association, which is the most important and inclusive of these organizations, keep closely in touch with developments and take whatever steps may be necessary to guard their legitimate interests. That misuse or abuse of power by the railroad administration might do them great harm is perfectly obvious. Present indications are, however, that government control, while it may injure some concerns and even some entire classes of concerns, will not cause any revolutionary changes in the railway equipment and supply business, such as government ownership might cause. As already indicated, the purchases of the railways probably will be largely increased under government control, and unless all signs fail in the long run there will not be as great changes in the relations of the supply companies and the railways as there seemed reason to apprehend a few weeks ago.

The committee of railway mechanical officers that has been engaged for some time on the designs for standard cars completed its work on them at a meeting at Washington on Monday and submitted its report to Director General McAdoo, through C. R. Gray, director of the division of transportation, for final approval. If the standards are approved they may be announced by the latter part of this week.

Members of the committee then went to Philadelphia to continue conferences with representatives of the locomotive builders on the proposed standards for locomotives.

CANADIAN RAILWAY REGIMENTS BUSY.—A summary of the work done by all battalions of the Canadian railway troops in France during the month of January has been issued by the Militia Department at Ottawa. The statement shows that during that period 9 miles of broad gage track were laid by the Canadians and 33 miles of narrow gage. The average number of miles of broad-gage track maintained during the month was 49, while 141 miles of the narrow-gage track was maintained. The men were employed in locating, grading, ballasting and laying lines. About 6,100 Canadians were engaged on the narrow-gage lines and 1,100 on the broad-gage lines.

Financing and Purchasing Division Organized in Two Sections

A PLAN FOR THE ORGANIZATION of the Division of Finance and Purchases of the Railroad Administration, which provides for the co-ordination and supervision of railroad purchases of materials and supplies by a central advisory committee at Washington and regional purchasing committees at New York, Atlanta and Chicago, was announced by Director General McAdoo on March 7. While all purchases of cars, locomotives and rails, and of cross ties which cannot be obtained along the lines of the respective roads, will be made through the Washington office, and fuel purchases for New England will be made by a special committee, the plan does not contemplate the centralization of all purchases.

All other supplies and materials needed for current operation will be purchased, for the time being, through the purchasing departments of the respective roads under a general supervision of the regional purchasing committees and the central committee.

The plan of organization was submitted by John Skelton Williams, director of the division of finance and purchases, which is to be divided into a finance section and a purchasing section. In the organization of the purchasing section Mr. Williams has been assisted by Samuel Porcher, purchasing agent of the Pennsylvania Railroad.

Finance Section

The director of the division will be assisted in the work of investigating and providing plans to meet the financial requirements of the railroads throughout the country, whether these needs relate to the taking up and renewal of maturing obligations and the issuance of new securities, or the provision for betterments and additions, by an advisory committee of three men, experienced in finance, selected, one from the North, one from the West, and one from the South. These men, whose names will be announced later, will serve the government without compensation, and will have offices in Washington.

The requirements for new capital, outside of revenue from earnings, for new equipment, betterments and additions, have usually called for from $250,000,000 to $750,000,000 per annum, according to the activity of business and the condition of the money market.

Purchasing Section

In the matter of purchases for the railroads, which will amount to between $1,000,000,000 and $2,000,000,000 per annum, the director of the division will be assisted by an advisory committee of three, which will be composed of the general purchasing agents or vice-presidents in charge of purchases of three leading railroad systems, who will be detailed to Washington for this work, under the supervision of the director of the division.

There will also be constituted three additional committees; these committees to be composed of three or more general purchasing agents, or men experienced in this work, to be known as the regional purchasing committees, with headquarters in New York, Chicago, and Atlanta, in touch with the regional directors of these three districts.

All purchases of locomotives, passenger, freight and other cars, and steel rails will be made directly through the office of the director of purchases.

In New England territory fuel purchases will be made by a special committee appointed by the regional director, under the direction of the Washington office. In other sections, each railroad will be expected to handle its requirements, under the immediate direction of the respective regional purchasing committees, either collectively with other companies, or separately, as may be directed by that committee. The details of all contracts already made and of all other contracts as made will be scrutinized and checked by the regional purchasing committees, which will act under the general direction of the Central Committee.

Cross ties and lumber which can be obtained along the lines of the respective roads will be negotiated for and purchased through the purchasing department of each road, under the supervision of the regional purchasing committees. Cross ties needed by the various roads which cannot be obtained on their own lines will be purchased through the Washington office.

All other supplies needed for current operations will be purchased, for the time being, through the purchasing departments of the respective roads, but all contracts for periods of six months or longer must be approved by the regional committees before completion.

Information as to the prices paid for all supplies will be furnished monthly by all roads to the regional purchasing committees, so that the prices paid by each road for all articles may be carefully compared and checked, both as to prices and standards, qualities and places of delivery.

The regional purchasing committees will address themselves, as soon as possible, to consideration of the opportunities for standardizing and consolidating purchases of every kind that may admit of such treatment, with a view to increasing efficiency and economy.

The regional purchasing committees will submit to one another and to Washington, as information and for criticism, full statistics as to cost prices of materials used in railroad operations, and these prices will be carefully compared and checked.

The names of the advisory and regional committees are given below.

Personnel of Finance Section

Advisory Committee, located at Washington, will include: Franklin Q. Brown, New York; Festus J. Wade, St. Louis; Frederick W. Scott, Richmond.

Mr. Brown, formerly of Boston, but now the senior member of the banking firm of Redmond & Co., of New York, was for many years vice-president of the Plant System of railroads; also president of the Plant Investment Company, controlling, besides railroads, coast-wise steamships and other transportation companies, including the Southern Express Company. Mr. Brown has had considerable experience both in the construction and operation of railroads; and for the past 10 years has been engaged in the banking business in New York.

Mr. Wade is president of the Mercantile Trust Company of St. Louis, one of the largest banking institutions in the West, organized by him about 20 years ago, and one of the first large trust companies to become a member of the Federal Reserve System. Mr. Wade has also been active in railroad reorganizations in the West; was a leading factor, soon after the outbreak of the war, in the establishment of the "Hundred Million Dollar Cotton Fund," and has been a student of railroad as well as of financial and banking problems.

Mr. Scott, of Richmond, has been prominent in banking and railroad circles in the South for many years past; is identified with one of the oldest national banks in Virginia; has for many years been a director in the Atlantic Coast Line; and was organizer of the syndicate which a few years since acquired control of the Chesapeake & Ohio, from which he later retired. He headed the shareholders' protective committee of the International Mercantile Marine Corporation, which was successfully reorganized without foreclosure; and has been active in railroad and other enterprises in the South.

The Central Advisory Purchasing Committee, with headquarters at Washington, is composed of: Henry B. Spencer,

Washington; Samuel Porcher, Philadelphia; George G. Yeomans, New Haven.

Mr. Spencer is vice-president of the Southern Railway in charge of purchases, and was chairman of the Committee on Materials and Supplies of the American Railway Association's Special Committee on National Defense. He has been connected with the Southern Railway since his graduation from Harvard University in 1895; and for a while prior to his election as vice-president was general manager of that system.

Personnel of Purchasing Section

Mr. Porcher was born in South Carolina. He is a graduate of the University of Virginia, and since 1913 has been general purchasing agent of the Pennsylvania Railroad, with which road he has been connected since 1882.

Mr. Yeomans was born in New Jersey; is a graduate of Princeton University; served with the Chicago, Burlington & Quincy Railroad from 1884 to 1905; was subsequently assistant to the President of the Wabash, and since 1915 has been general purchasing agent of the New York, New Haven & Hartford.

The Regional Purchasing Committees, to be located respectively in the Eastern, Western and Southern Districts, are as follows:

NEW YORK: E. H. Bankard, general purchasing agent of the Baltimore & Ohio; S. B. Wight, general purchasing agent of the New York Central Lines; E. T. Burnett, of Roanoke, Va., purchasing agent, Norfolk & Western.

CHICAGO: Charles A. How, general purchasing agent of the Missouri Pacific; L. S. Carroll, general purchasing agent of the Chicago & North Western; Ira O. Rhoads, general purchasing agent of the Southern Pacific Company.

ATLANTA: F. H. Fechtig, general purchasing agent of the Atlantic Coast Line; Albert C. Mann, purchasing agent of the Illinois Central; H. T. Shanks, of Louisville, Ky., purchasing agent of the Louisville & Nashville.

Railway Freight Operations For November

THE NUMBER OF REVENUE TON MILES of freight transported by the railways of the United States for November, 1917, increased 2.9 per cent, or from 32,231,086,866 to 33,151,364,499, as compared with November, 1916, according to the monthly report compiled by the Bureau of Railway Economics. The revenue ton miles per freight locomotive increased 2.5 per cent but the average per freight car decreased 1.3 per cent. Freight train miles decreased 0.9 per cent, loaded freight car miles decreased 3.9 per cent, and locomotive miles decreased 1.1 per cent. Non-revenue ton miles increased 8.7 per cent.

The average number of freight cars in service increased 4.2 per cent and of locomotives increased 0.4 per cent. The tonnage per train was 655 as compared with 628 in November, 1916, and the tonnage per car increased from 25.3 to 27.2, or 7.5 per cent. The average miles per locomotive per day decreased 1.5 per cent and per car per day decreased 7.1 per cent.

In the eastern district revenue ton miles handled increased 2.1 per cent, in the western district 2.9 per cent and in the southern district 4.7 per cent.

For the combined eight months, April to November, inclusive, revenue ton miles increased 11.3 per cent, the tons per car increased 9.3 per cent, and tons per train increased 7.3 per cent. The average number of revenue ton miles per freight locomotive increased 10 per cent and per freight car 8.3 per cent. The average mileage per locomotive per day increased 2.8 per cent to 68.7 miles, while the average mileage per car per day decreased 0.4 per cent to 27.5. The percentage of empty car mileage increased 1 per cent to 30.1.

Letters From Overseas*

THE FOLLOWING LETTER has been received by a railroad man from a lieutenant in one of the railway regiments in France:

"Your welcome letter of December 11 received a few days ago and it surely was a distinct pleasure to hear from you, as letters from friends and loved ones back home bring about the only sunshine that enters our lives out here in the war zone.

"Myself and all the men in my district experienced as enjoyable a Christmas as we could hope to so far, far from home, for we all received many nice packages, the most of which reached us a few days before Christmas. Our Chicago Great Western present arrived a short time after Christmas and was surely appreciated by every member of Company C. Myself and two other officers spent the first three days of the New Year in Paris. About every sixty days I run into Paris for three days' recreation, as it does one a lot of good to get out of the war zone and back to real life and civilization occasionally.

"Our regiment is still busily engaged in successfully operating one of France's most important lines of communication, and until the past two or three days we have been handling a record business, as the troop movement has been quite heavy, bringing the troops from the trenches for rest and transferring them from one part of the front to another. I was particularly impressed with a troop train we handled the other day, as it was a train of French soldiers coming from the trenches for a few days' rest, and although they were literally covered with mud from head to foot, yet they looked hale, hearty and carefree, for they were singing and seemed quite happy, because they were out of the trenches and mud for a few days' recreation and an opportunity to clean up. The French are wonderful soldiers and wonderful people, and while the dirty Huns are able to kill some of them, yet they will never be able to conquer the indomitable French spirit.

"We now have all of the U. S. A. engineers that are going to be assigned to us, and they are certainly rendering fine service. We are handling at least 40 per cent more tonnage per train per mile than with the French power, and have naturally effected a marked reduction in both train and engine mileage, which results in fuel economy that surely is a vital question over here. These engines are much easier on track than I anticipated, and are not causing any trouble at all in kicking our curves out of line. The winter in our part of France has been most mild, certainly a marked contrast to winters I have been accustomed to in Minnesota the past five years. Our weather during the last two weeks has been like spring and our section men are surfacing track every day now.

"We are all quite optimistic over here, and are of the opinion that a big successful drive by our Allies in the Spring will end it all and bring the dirty, fiendish Huns to their knees."

ON THE NEW YORK, CHICAGO & ST. LOUIS, the green or white flags carried on the front of locomotives are supported on the pilot beam; and the Chicago Great Western and the Bessemer & Lake Erie also have an arrangement somewhat different from the usual practice of putting the flags at the side of the headlight. These facts are given in a circular issued by the National Safety Council, W. H. Cameron, general manager, Chicago, which has been issued in connection with an inquiry made by the Council as to injuries to men in putting up the flags. Cases have been reported of serious injuries to firemen by falling from the top of the engine.

*The *Railway Age* expects to publish regularly letters from railwaymen overseas. If you receive a good letter from a railwayman who is now in France, send it in for publication and let the *Railway Age* pass it around for all to enjoy.

Unusual Failure of a Railroad Draw Bridge

Train Pushed the Span Off the Pier at One End, Causing It to Tip Down Into the River

THE failure to stop a freight train approaching a draw span on a middle-western road on Sunday, February 17, after the bridge had started to swing, resulted in the freak accident shown in the pictures. Running part way onto the bridge while it was swinging, the train pushed the span in a longitudinal direction a sufficient distance to clear the bridge-seat on the loaded end, with the result that the span was tipped down into the position shown, carrying with it the engine and two cars that had run onto it. No loss of life or personal injuries resulted.

The bridge was built about 1897 and consists of a 238-ft. draw span flanked on the south by a 92-ft. pony span and on the north by four 157-ft. through Pratt truss spans. All of the spans are pin connected and the substructure is ashlar masonry. The draw span has a rim-bearing center and end lift equipment of a type in which the shoes are raised and lowered in a vertical direction by toggles, the bottoms of the shoes being shaped to engage depressions in the bearings on the bridge-seats. The rail locks are of the vertical-lift type with butt-jointed rails.

The accident is accounted for by the failure of the engineman to observe the signals in time to stop his train. Preparations were being made to swing the span for the passage of a boat as a freight train was approaching from the south. The bridge is not protected by interlocking, but the red flag and torpedoes set against the train were apparently ignored as the train failed to stop. The bridge tender said that he had raised the rail locks and the end bearings and had attempted to swing the bridge but found it jammed in some manner so that there was an appreciable delay in starting the swinging movement. This fact undoubtedly saved the train from going into the river for, because of this delay, the span was turned only a few inches when the train reached it, so that a portion of the train readily passed onto the span, although all of the wheels were derailed except the first two wheels on the engine.

There is a lack of definite data on the speed of the train at the instant that it struck the span. The trainmen maintain that the velocity was about 3 miles per hour, but the physical evidences point to a speed much higher than this. The locomotive and two cars passed onto the span before coming to a stop, and the resulting longitudinal thrust produced a most remarkable displacement of the superstructure. The draw span was pushed 6 ft. north and two feet east (upstream) and this span in turn pushed the adjacent 157-ft. span 20 in. to the north. The second fixed span was moved 16 in., the third one 3 in. and the fourth one 2 in. The spans were not anchored to the masonry, but it is believed that more serious results would have been brought about had the spans been firmly secured to the substructure.

View Showing How the Span Swung in Tipping Down

Method of Raising the Span

Being deprived of its support at the heavy end, the draw

span tipped down like an unbalanced scale. The pictures show the engine almost entirely out of the water with the tender nearly submerged. Behind the latter was a coal car completely submerged, while a second car hung in an inclined position with its rear trucks on the pier, this car being removed before the picture was taken.

In tipping, the span made an appreciable turn in a horizontal plane so that the south end was swung about 15 ft. to the south. In the longitudinal movement that preceded the tipping the north end of the swing span became jammed tightly against the end of the adjacent fixed span, and in

View of the Span from the Northwest

consequence when the tipping motion started the end of the fixed span was lifted about 2 ft. and also swung somewhat to the east before it was released from the end of the swing span, and dropped back onto the pier. The top of the latter was seriously shattered.

The principal damage to the span was the crushing of the drum on the side which carried the weight of the span while in the inclined position, and a rather serious battering of the floor system in the two panels nearest the south end of the bridge. One hip vertical was also badly buckled.

The Position of the Drum Gives an Idea of the Longitudinal Displacement

As seen in the photographs the bracing in the tower panel is too light to take more than a nominal shear and was entirely inadequate to transmit the enormous dead-load shear obtaining in this panel while in the tipped position. In consequence resistance to collapse of the tower panel was afforded principally by the stiffness of the bottom chords and the floor system. One of the light tower diagonals broke some time after the accident occurred.

The method of restoring the structure is shown in the large photograph. A large gallows frame was erected over the south end of the span, supporting it on two groups of piles driven in either side of the span by a marine driver. After lashing the locomotive and tender securely in place on the bridge the submerged coal car was drawn out through the south portal of the span. Then by means of heavy hoisting tackles supported from the gallows frame and attached to the hip pins, the span was slowly raised, the power being supplied by hoisting engines on the marine pile driver and a derrick car standing on the 90-ft. pony span. Auxiliary lines from the winch heads on the hoisting equipment were also made use of.

After the span had been raised to within about 4 ft. of the final elevation the south end was supported temporarily on a grillage of I-beams resting on the falsework. With the bridge in this position it was possible to remove the engine and tender after which steps were taken to shift the span to its proper position on the pivot pier. On account of the damage done to various parts of the superstructure it has been found necessary to place the draw span on falsework before restoring traffic.

Railway Revenues and Expenses in 1917

RAILWAY OPERATING INCOME in the calendar year 1917 was $967,268,523, or $121,000,000 less than in 1916, according to the summary of railway returns for December and for the 12 months ended December 31, 1917. The income per mile decreased 11.4 per cent. Railway operating revenues for the first time crossed the four billion mark, amounting to $4,041,014,239, as compared with $3,625,252,371 in 1916, an increase of $416,000,000, or 11.2 per cent per mile. Operating expenses amounted to $2,852,880,196, an increase of $476,000,000, or 19.8 per cent per mile, while taxes were $220,162,949, an increase of $61,000,000. The operating ratio was 70.6, whereas in 1916 it was 66.55. Most of the decline in operating income was in the Eastern district, where the reduction was $89,000,000, a decrease of 19.4 per cent per mile, and the operating ratio increased from 67.97 to 75.03. In the Southern district there was a reduction in income of nearly $3,000,000, and in the Western district of $29,000,000.

For the railroads as a whole all items of revenue showed large increases except that from mail traffic. While freight revenues increased approximately 10 per cent to $2,829,246,769, and passenger revenues increased from $707,757,469 to $825,496,365, or 16 per cent, the mail revenues actually decreased, as a result of the Postoffice Department's new policy of paying for the mail on the space basis, from $61,227,765 to $58,681,549. Express revenues increased from $90,311,885 to $106,895,282. Every item of expense, except that of transportation for investment, also showed a large increase. Maintenance of way and structures cost $444,458,855, compared with $424,530,358 in 1916. Maintenance of equipment increased from $598,714,857 to $691,025,391. Traffic expenses increased from $62,915,931 to $64,966,241. Transportation expenses increased from $1,185,833,399 to $1,529,800,773, or 29 per cent.

For the month of December the figures reflect plainly the severe weather conditions then prevailing. While revenues increased from $311,000,000 to $335,000,000, expenses increased from $209,000,000 to $251,000,000; taxes increased from $14,479,000 to $24,369,000, and operating income was reduced from $86,869,000 in 1916, to $59,204,000. In the Eastern district while revenues increased about $7,000,000, expenses increased $19,000,000, and the operating ratio was increased from 72.01 to 82.22.

The detailed figures showing per mile averages, as compiled by the Bureau of Railway Economics, are as follows:

REVENUES AND EXPENSES OF STEAM ROADS—DECEMBER, 1917.

Compiled from monthly returns of the railways to the Interstate Commerce Commission and covering roads of Class I, *i. e.*, roads with annual operating revenues above $1,000,000.

Account	United States				Eastern District				Southern District				Western District			
	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent
Total operating revenues	$335,332,405	$1,450	$1,346	7.7	$140,894,558	$2,388	$2,257	5.8	$54,919,523	$1,281	$1,129	13.4	$139,518,324	$1,078	$999	7.9
Freight	220,578,437	954	929	2.7	91,924,533	1,558	1,537	1.3	35,445,245	827	796	3.9	93,208,659	720	693	3.9
Passenger	80,759,573	349	283	23.4	32,475,965	550	470	17.1	14,939,045	348	240	45.3	33,344,563	258	211	21.9
Mail	4,478,218	19	25	d 21.0	1,737,064	30	38	d 22.8	758,339	17	20	d 12.2	1,982,815	15	19	d 22.3
Express	10,275,051	45	39	12.7	4,608,985	76	66	18.4	1,671,291	39	35	12.3	3,994,775	31	29	7.2
All other	19,241,126	83	70	18.3	10,148,011	172	146	18.0	2,105,603	50	38	25.9	6,987,512	54	47	17.2
Total operating expenses	251,647,238	1,088	907	19.9	115,849,067	1,964	1,625	20.8	36,425,620	850	700	21.4	99,372,551	768	645	19.0
Maintenance of way and structures	23,557,045	102	129	d 21.2	7,895,960	134	203	d 34.1	3,923,076	92	119	d 23.3	11,738,009	91	98	d 7.8
Maintenance of equipment	61,863,350	267	222	20.5	29,403,694	493	393	27.0	9,334,197	218	180	20.7	23,125,459	179	157	13.8
Traffic	5,528,922	24	24	d 2.9	2,132,405	36	36	d 0.7	1,061,919	25	25	d 0.8	2,334,598	18	19	d 5.4
Transportation	149,452,797	646	490	31.7	71,179,871	1,207	914	31.9	20,442,131	477	346	37.9	57,830,795	447	343	30.3
General	8,729,903	38	36	5.4	3,837,497	65	61	7.3	1,427,950	33	28	21.9	3,454,456	26	27	d 1.5
All other	2,515,221	11	6	92.9	1,399,640	24	16	27.6	226,347	5	2	143.4	869,234	7	1	729.0
Net operating revenue	83,685,167	362	439	d 17.6	25,045,491	424	632	d 32.8	18,493,903	431	429	0.5	40,145,773	310	354	d 12.3
Taxes	24,369,912	105	62	68.1	7,717,951	131	91	43.5	4,765,190	111	48	132.3	11,886,771	92	55	68.7
Uncollectible revenues	111,181	1	1	....	28,530	*	1	....	10,603	*	*	....	72,048	*	*	....
Operating income	59,204,074	256	376	d 31.9	17,299,010	293	540	d 45.7	13,718,110	320	381	d 16.1	28,186,954	218	299	d 27.1
Operating ratio—per cent—																
1917		75.04				82.22				66.33				71.23		
1916		67.38				72.01				61.98				64.60		
Average mileage represented—																
1917		231,266				59,004				42,874				129,388		
1916		231,122				59,269				42,720				129,133		

d Decrease. * Less than one dollar.

YEARLY SUMMARY, YEAR ENDED DECEMBER 31, 1917.

Compiled from monthly returns of the railways to the Interstate Commerce Commission and covering roads of Class I, *i. e.*, roads with annual operating revenues above $1,000,000.

Account	United States				Eastern District				Southern District				Western District			
	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent	Amount, 1917	Per mile of line 1917	Per mile of line 1916	Increase over 1916, Per cent
Total operating revenues	$4,041,014,239	$17,482	$15,721	11.2	$1,803,619,108	$30,488	$27,683	10.1	$607,401,424	$14,191	$12,288	15.5	$1,629,993,707	$12,616	$11,354	11.1
Freight	2,829,246,769	12,240	11,165	9.6	1,250,597,860	21,140	19,441	8.7	435,281,262	10,170	9,048	12.4	1,143,367,647	8,850	8,059	9.8
Passenger	825,496,365	3,571	3,069	16.4	358,306,090	6,057	5,353	13.2	126,948,362	2,966	2,306	28.6	340,241,913	2,633	2,271	16.0
Mail	58,681,549	254	266	d 4.4	23,218,961	392	385	1.9	9,036,414	211	197	7.4	26,426,174	205	233	d 12.3
Express	106,895,282	463	392	18.1	50,275,026	850	720	18.1	14,763,477	345	307	12.3	41,856,779	324	269	20.6
All other	220,694,274	954	829	15.1	121,221,171	2,049	1,784	14.8	21,371,909	499	430	16.2	78,101,194	604	522	15.8
Total operating expenses	2,852,880,196	12,342	10,305	19.8	1,353,314,671	22,876	18,815	21.6	413,587,650	9,663	7,992	20.9	1,085,977,875	8,405	7,156	17.5
Maintenance of way and structures	444,458,855	1,923	1,841	4.4	186,148,621	3,146	2,986	5.4	68,679,084	1,605	1,510	6.2	189,631,150	1,468	1,424	3.1
Maintenance of equipment	691,025,391	2,990	2,596	15.1	331,796,596	5,609	4,853	15.6	109,969,630	2,569	2,201	16.7	249,259,165	1,929	1,689	14.2
Traffic	64,966,241	281	273	30.0	25,283,476	427	406	5.2	12,139,790	284	275	3.1	27,542,975	213	211	1.2
Transportation	1,529,800,773	6,618	5,142	28.7	752,723,364	12,724	9,736	30.7	206,384,238	4,822	3,664	31.6	570,693,171	4,417	3,519	25.5
General	96,418,745	417	369	13.2	42,393,829	717	630	13.7	14,518,315	339	310	9.3	39,506,601	306	267	14.3
All other	26,210,191	113	84	34.9	14,968,785	253	204	24.4	1,896,593	44	32	38.2	9,344,813	72	46	56.2
Net operating revenue	1,188,134,043	5,140	5,416	d 5.1	450,304,437	7,612	8,868	d 14.2	193,813,774	4,528	4,296	5.4	544,015,832	4,211	4,198	0.3
Taxes	220,162,949	952	691	37.9	79,065,299	1,336	1,084	23.3	36,070,326	843	526	60.3	105,027,324	813	564	44.0
Uncollectible revenues	702,571	3	4	....	230,208	4	6	....	113,084	2	4	....	359,279	3	3	....
Operating income	967,268,523	4,185	4,721	d 11.4	371,008,930	6,272	7,778	d 19.4	157,630,364	3,683	3,766	d 2.2	438,629,229	3,395	3,631	d 6.5
Operating ratio—per cent—																
1917		70.60				75.03				68.09				66.62		
1916		65.66				67.97				65.04				63.02		
Average mileage represented—																
1917		231,155				59,157				42,801				129,197		
1916		230,606				59,229				42,616				128,761		

d Decrease.

The Sanitarian's Work Is Valuable to a Railroad

An Outline of the Work Being Done to Remove Unhealthful Conditions on the Illinois Central

By A. E. Campbell
Health Officer, Illinois Central, Chicago.

GENERAL SANITATION was once considered of value mainly as an adjunct in limiting possible epidemics, but modern public health work has developed its ideas and functions far in advance of this corrective form of work, and its attention is now focused mainly upon broad measures concerned with the prevention of disease and its hazards. If we cover machinery to prevent possible accident, why should we not clean up our laborers and their environment, vaccinate them, for instance, to prevent a possible epidemic and an outbreak of small pox to disturb the harmonious operation of our large plants? Our modern industrial plants have employed experts to study their complicated machinery and obtain maximum of efficiency. Why should the human machine be neglected?

Large industrial organizations are beginning to appreciate the value of promoting the efficiency of the individual employee. The experienced employee is one of the greatest assets of any industrial organization, and the problem is how to keep him employed at his work the greatest number of days in the year and how to keep him physically fit and consequently at his highest state of efficiency.

The Illinois Central and Yazoo & Mississippi Valley have well-developed hospital departments through which the employees receive all medical and surgical care for a small monthly contribution. Careful attention is also given to sanitary measures as regards both working and living conditions of the employees.

Along the lines of the Illinois Central malaria was formerly so common that in certain sections 40 to 50 per cent of the employees would be incapacitated at times by that disease. We early began the use of quinine as a prophylaxis, and we have found that, by administering 12-grain doses of it twice a week to each employee, we can absolutely prevent the development of malaria, even though individuals may become infected.

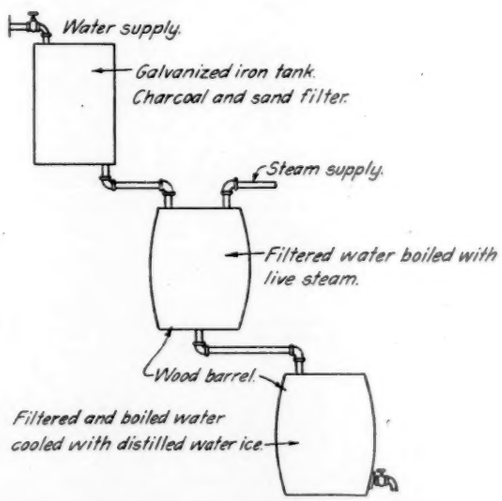
Drinking Water Is Examined Carefully

The drinking water at all our shops was investigated. At one point, where a great deal of sickness had developed, it was found that all drinking water was taken out of a surface well with a chicken yard and an outside surface privy quite near, both draining toward the well. The city water was fully three-fourths of a mile distant. We equipped eight large barrels with hinged covers on the top and faucets at the bottom, and hired a negro with a wagon to haul four barrels of city water in the morning and four in the evening and distribute it in the shops. After that we did not have one case of bowel or stomach disturbance. At other places the water, which was taken from rivers or ponds, became quite murky and unfit for drinking after heavy rains. This water was sedimented and then sterilized with lime, by means of an apparatus such as shown in one of the drawings. Now we use lime to sterilize all the drinking water.

The drinking water all through southern Illinois comes from shallow wells, nearly all of them showing gross pollution, and although we had a sign on each of our wells—"The use of this water for drinking purposes is forbidden"—still our employees and the traveling public continued to drink the polluted water, and we felt that we should do something to lessen this danger. In some cases we have had to resort to water-tight cisterns in which the incoming water has to pass through three feet of sand before entering the cistern. It then passes through a brick wall before being pumped for drinking purposes, so that the rain water is well purified. This style of cistern has been approved by the Public Health Service.

We have abolished the scavenger. When any of the vaults of our outside closets need cleaning, we remove the building, cover all excretions with waste, cobs, wood, or creosoted ties, sprinkle with kerosene and burn, using some tar to keep down the odor, and keeping a hot coal fire over the contents for some time. The pit is then filled in and a new one dug 8 ft. deep, and 6 in. of chloride of lime is put in the bottom. This has worked well with us and has had the unqualified endorsement of municipal and state officers.

We keep our privies dark and as it is very difficult to keep them screened, it has been thought advisable to have them painted black inside as this tends to keep out flies. The doors to all outside toilets should be separated and both the men's and women's toilets screened from view and properly designated. The bottom of the screen should be 16 in. from the ground. The waste from all construction crews is also watched and all gangs are provided with portable toilets. On one division this toilet is now made in one piece,



A Method of Filtering and Sterilizing Water for Trains During Flood Times

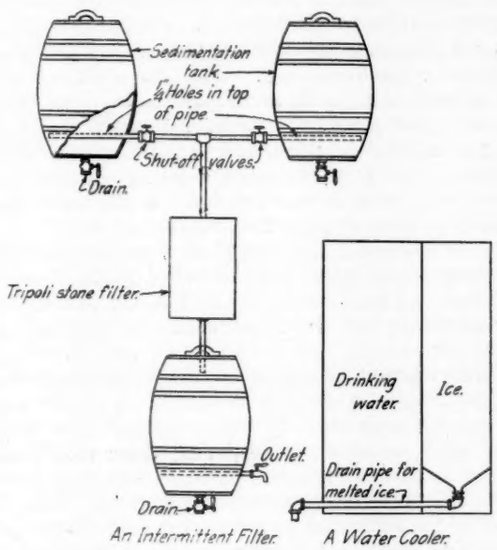
as when sent out knocked down, the different pieces often get lost.

At one of our shops our employees were greatly annoyed by small insects that swarmed through the place, lighting on the victims' faces and hands. We sent samples of them to the Bureau of Entomology at Washington, which informed us that they were white ants, insects very destructible to wood, water tanks, railroad ties, and all wood in the building. They advised that we remove all flooring in the shop, soak the ground with kerosene, and substitute creosoted blocks for flooring. This was done, the annoyance was re-

moved, and an insect pest destroyed that might have proved very expensive to the company.

The reports of the sanitarian are made out in triplicate, one copy going to the general manager, one to the general superintendent, and one to the local superintendent. Thus the needs or desires of the employees are brought direct to the attention of the management. Laborers complained that their living quarters were cold and scarcely fit to live in in cold weather. The sanitarian made a tour of every laborer's shack on that division, in company with the supervisor of buildings, and made a detailed report of every one. Within two months every shack on that division was papered with tar paper, lined and refloored, and painted throughout, adding much to the comfort of the laborers.

The ventilation of waiting rooms and ticket and general offices has received attention. All waiting rooms in stations



Two Forms of Drinking Water Supplies

are ventilated by lowering the upper sash windows on the side opposite the prevailing winds. In this way the air is kept at an agreeable temperature. In general offices, where there are one hundred or more clerks, weights are placed on all papers and windows are thrown open at 10 A. M. and 3 P. M. each day, while the clerks stand up and walk around. In ticket offices, the draft coming through the ticket window causes frequent colds. At one terminal this draft was the cause of six employees leaving the office because of pulmonary tuberculosis, three of whom died. This draft can be overcome by installing other openings such as a transom over the door, or a lattice work over the ticket window, to subdivide the air passage and control the draft.

Large offices are surveyed for the detection of early cases of tuberculosis, and if any employees seem to be in declining health they are examined, treated, and stationed near windows. Clerks who are thin and anæmic are treated and built up, probably being given a vacation or a change in their work.

Attention to the Traveling Public

Many railroads have not had any definite system of cleaning their stations and toilets. They were cleaned by the section men when the agent thought the places were dirty, or when some passenger complained. Then they were left until another complaint reached the agent or the management. We adopted a regular routine of scrubbing stations at terminals every second day, at county seats and junction points twice a week, and all other stations once a week. The floors and toilets of all stations at terminals, county seats, and junction points should be swept twice a day, and the toilets scrubbed twice a day. At all of our stations, the raising of dust when sweeping was a problem that had to be solved. We had a preparation put up at our shops, composed of ocean sand, salt, sawdust and arctic engine oil. Besides keeping down dust, this preparation possesses cleaning properties that make it valuable. A method used by some of our agents in sweeping is to put an ordinary gunny sack over the handle of a wide pushbroom, so arranged that the handle passes through the center of the gunny sack, turn this over and under the pushbroom, and dampen the sack with kerosene oil. By this means dirt can be removed very readily without the raising of any dust.

The water and ice used on trains are watched with great care. At one large terminal where many trains were watered, the city water became polluted owing to floods. We had a sand-and-charcoal filter built promptly, and all water used was passed through this, and then into a large tank, where it was boiled for 20 min. with live steam. Then the water was passed over ice manufactured from distilled water after which it was put in the coolers. All coolers were washed out with boiled water, and the hands of attendants were also washed with water that had been boiled. During all the flood period we did not have a single complaint from passengers.

At one terminal used by two large railroads the only available drinking water came from a spring which had an environment indescribably bad—outside surface privies, chicken yards, hog pens, and kitchens all draining toward this spring. Examination of this water showed 23,000 bacteria to the cubic centimeter. Four ounces of lime was added and this spring was walled to a height of about four feet. Ten hours after adding the lime a sample of the water was examined and found absolutely sterile. Two weeks later another sample was examined with the same result. All our section crews in this part of the country carry a lime solution and are instructed how to sterilize any water they may use. At all junction points, where the water is bad, water coolers are installed in waiting rooms and the water is sterilized for drinking purposes.

We are also watching the drinking water used at all our restaurants, even if our trains are not watered at these stations. At one large terminal, where fully 500 persons ate daily at the restaurant, examination of the drinking water showed three thousand bacteria on gelatin and ten thousand on agar. The manager was at once notified; arrangements were made to have all the drinking water sterilized in a large cooler, and all drinking water served to the public taken from this cooler. The hands of waitresses and the dishes used are washed with water that has been boiled.

The ventilating of trains is also attended to. On suburban trains during rush hours we see that the rear end sash is open. When the train is standing full we have the sash of the front and rear doors open. In this way the air is being changed constantly. The heating of trains in both northern and southern climates is often very perplexing. If 90 lb. pressure is required to maintain steam through a long train, this amount will keep the train entirely too warm in a southern climate unless the temperature is controlled by the train crews. All steel coaches running south should have ceiling paddle fans, as steel becomes very hot. Here are good rules to observe:

1. When the temperature reaches 75 deg. with the train moving, turn off the steam on the sunny side or on the side of the train opposite to the prevailing winds.

2. Always keep the transom of the rear door open when there are many passengers in a coach. It should always be open when the train moves, but should be closed when the temperature falls to 70 deg.

3. Avoid drafts on a cold day. Do not open the transom

on the side of the train when the wind is blowing against it. Keep the front doors on all suburban and through trains closed, unless you wish to cool the coaches quickly.

4. If passengers complain of excessive heat, move them to the outer ends of their seats or to seats near the door.

5. If a temperature of 75 deg. is maintained in a rapidly moving train, there will be no complaint, since the temperature drops as the speed of the train is increased.

The cleaning of trains in transit becomes very necessary when a train travels overnight. A porter should sweep it once or twice while on the journey. The water coolers on trains should have separate apartments for water and ice, and the pipe carrying the melting ice water should cross the lower part of the water cooler so as to cool the drinking water as it escapes.

Attention Is Given to the Food

Restaurants along the line need attention. It was found in many places that one-half of all the refrigerators were unable to maintain a temperature lower than 55 deg., and that sensitive foods, including milk and cream, were kept with vegetables and fish. No attention was paid to the proper cleaning of ice boxes, as it was no person's business to attend to that part of the work. Grease traps were full to overflowing, and when emptied were put back into the sewer.

We brought about a number of changes in these conditions. Now all food is covered at all restaurants, ice boxes are watched and kept clean, and new refrigerators have been installed at many points. The ventilation in our new diners is much improved; the upper half of the door entering the kitchen is open and screened, a canopy has been placed over the stove and an exhaust fan over the canopy. Every diner leaving Chicago is examined regularly and the dining room is closely inspected each month.

The following instructions were issued to all chefs on dining and private cars and all handlers of food at restaurants:

1. Keep all dairy products, such as milk, cream, butter, and cheese, in one compartment. Cheese should be in a box on the upper shelf, if possible, butter on the lower shelf.

2. Keep all bakery goods by themselves; pies should be kept in a locker, cookies wrapped in paraffin paper (neither of these need necessarily be in the ice box).

3. Keep all meats—beef, pork, veal, mutton—in one compartment and as far as possible in the bottom of the cooler on a clean cloth. Chickens can be carried with meat provided that the heads and feet are covered and the fowls are separated from meats by a clean cloth.

4. Fish should be wrapped in a clean towel and packed in ice. No other food should be near it.

5. Lettuce should be trimmed and sprinkled with water and carried in brown paper or paper bags. All other vegetables should be carried in sacks.

6. Conserve all food; permit no waste. All trimmings of meat should be used in entrees or for soup stock as soon as trimmed.

7. Watch for decay in meat and chicken. If meat assumes a dark color, or smells bad, trim it off and use it at once.

8. Watch your ice box; go over it daily and clean it carefully. Arrange all food as here directed, as far as possible, and you will have no trouble.

The carriage of meat and produce on diners during the hot months is a very difficult problem, owing to the close proximity of the fire to the cooler; and as the door is opened so frequently during the preparation of a meal the temperature of the cooler sometimes rises 10 to 15 deg. in one hour. For this reason railroads should control the eating houses along their line, so that all meats can be exchanged and a fresh supply carried on the diner.

Not long ago we were asked as to the effect of fish on drinking water, as the company is building a large dam in Kentucky and expects to use the water supply thus obtained not only for engines, but also for drinking water at our shops and for watering our trains at that point. It was proposed to introduce fish into the reservoir, but the sanitarian insisted that fish pollute water, and if they abound in small lakes or water which is dammed, their pollution becomes a serious matter, calling for some form of treatment. Besides, fish bring fishermen, and fishermen in boats are also liable to pollute the water in many cases. Not only was it felt that no fish should be put in the lake, but that it should be protected from human visitation, and the grounds around it should be likewise guarded.

Advantages to the Employees

Efficiency engineers today recognize the fact that employees work to better advantage and with greater speed and accuracy if their surroundings are cheerful and well lighted. In considering a lighting installation the subject of brightness should never be overlooked. The investigations of Prof. C. E. Ferree, of Bryn Mawr Psychological Laboratory, indicate that after three hours of work under daylight, the eye loses approximately 5 per cent in efficiency, and that under the indirect system of artificial lighting the loss is about 7½ per cent during the same period. While under the semi-indirect and direct systems the loss reaches over 70 per cent. This latter loss is due to direct glare from the units and also to the specular reflection from polished surfaces, desk tops, etc. Hence we have installed the indirect system at many of our terminals and also in our new office building at 63rd St., Chicago.

The development of sanitation offers advantages for educating the laborer in sanitary measures. If he is surrounded in the workshop or office by ideal sanitary conditions, he is thereby made capable of comparing these conditions with those that obtain in his home. In this way men are unconsciously led to desire a higher environment. The personal relation of the sanitarian to the worker in the office or workshop is a means by which the principles of personal hygiene are so inculcated as to be applied, and not regarded as fads of the medical profession.

Within the past year we have taken up another educational feature which, it is believed, will prove of incalculable benefit to the management—that of giving instruction in first aid to the injured. One of the laborers is taken as an object lesson. He lies on the ground, as if he had been run over by a train. All laborers are shown how to make him comfortable, how to carry him or remove him from wreckage, how to warm him, or to arrest bleeding; step by step they are led through the methods of rendering first aid to the injured man. This training has been given at every shop on the system. It is not only educational but it is welfare work—and work which, if it is to be permanent in its operation and lasting in its results, must be founded on the bed rock of education.

With these aims in view, our employees are addressed in kindly words about their own work, and they are also made acquainted with the burden of care and responsibility borne by the management. They are told frankly that responsibilities in the railway service gravitate to the person who can shoulder them, and power flows to the men who "know how."

EQUIPMENT EXPORTS FROM ENGLAND IN 1917.—The British Board of Trade reports the exports of railway material of the following value during the twelve months ended December 31, 1917, the corresponding figures for 1916 being given in brackets: Locomotives, $8,075 ($6,485); rails, $3,450 ($2,910); passenger cars, $895 ($1,890); freight cars, $2,205 ($3,675).

Railroad Control Bill Passed by the Senate

Period Limited to 21 Months After War. Interstate Commerce Commission Retains Rate Authority

WASHINGTON, D. C.

THE BILL PROVIDING for the compensation of the railroads and prescribing the terms and conditions under which government control is to be exercised was expected to be passed early this week but it encountered unexpected delay in the Senate on Monday and its consideration was postponed until Wednesday. The delay was caused by the objection of several senators to the action of the conferees in adding section 15 restricting state taxation of the railroads. The bill was referred back to conference by the Senate on Wednesday; the objectionable features were removed and the bill was returned to the Senate late in the day and passed by a vote of 47 to 8. It is expected that the House will pass the bill before the end of the week.

The conferees appointed to reconcile the differences in the bill as passed by the House and the Senate reached an agreement on March 7, after considerable difficulty in effecting a compromise on the rate-making authority, and submitted their report to Congress March 9.

The conference report includes the provision that the period of government control shall extend not to exceed 21 months after the proclamation of peace terminating the war, and the provision for agreements between the roads and the President for compensation based on the average net operating income for the three years ending June 30, 1917. The section on rate-making, a compromise between those who feared any curtailment of the authority of the Interstate Commerce Commission and those who felt that the President should have a free hand to take action in an emergency, as well as to insure that the roads shall be made self-sustaining during the period of federal control, was written by Senator Robinson of Arkansas. Whereas the Senate bill proposed to authorize the President to initiate rates but to give the commission power to overrule his action after an investigation, and the House bill would have made the commission's report a mere recommendation to the President, the compromise adopted gives the commission final authority but requires it to take into consideration a certificate by the President that increased revenues are necessary to defray expenses and to pay the agreed compensation to the owners of the roads.

The President is placed in the position of an operating carrier that initiates a rate, but without the restriction imposed upon carriers by the requirement that they shall secure the commission's approval before filing an increased rate; and any rate he proposes will take effect without suspension. Upon complaint the commission shall conduct hearings in the usual way, giving due consideration to the fact that the roads are under a unified control and not in competition, and shall then make its findings and report.

The compromise was not reached, however, until the conferees had voted down a provision absolutely requiring the commission to make rates high enough to pay the railroads' guarantees and all expenses and also another that would have required the commission to hand down a decision in 30 days.

The language finally adopted would seem calculated to settle the controversy which has always been interjected into general rate advance cases before the Interstate Commerce Commission as to whether the commission's determination as to what are reasonable rates should take into consideration the needs of the railways for increased revenues or whether a "reasonable" rate is a reasonable rate regardless of its effect on revenues as a whole. If the President or the Director General of Railroads, therefore, should find it necessary to increase rates, as they are likely to find after the Wage Commission makes its report some time this month, their task will be much more simple than that of the railroads which have been in that position in the past.

The substitute section also provides that the act shall not be construed to amend, repeal, impair, or affect existing laws or powers of the states in relation to the lawful police regulations of the states, except wherein such laws, powers or regulations may affect the transportation of troops, war materials, government supplies or the issue of stocks and bonds. The text of the bill as reported by the conferees is as follows:

Provision for Compensation

"SEC. 1. That the President, having in time of war taken over the possession, use, control and operation (called herein Federal control) of certain railroads and systems of transportation (called herein carriers), is hereby authorized to agree with and to guarantee to any such carrier making operating returns to the Interstate Commerce Commission, that during the period of such Federal control it shall receive as just compensation an annual sum, payable from time to time in reasonable installments, for each year and pro rata for any fractional year of such Federal control, not exceeding a sum equivalent as nearly as may be to its average annual railway operating income for the three years ended June 30, 1917. That any railway operating income accruing during the period of Federal control in excess of such just compensation shall remain the property of the United States. In the computation of such income, debits and credits arising from the accounts called in the monthly reports to the Interstate Commerce Commission equipment rents and joint facility rents shall be included, but debits and credits arising from the operation of such street electric passenger railways, including railways commonly called interurbans, as are at the time of the agreement not under Federal control, shall be excluded. If any lines were acquired by, leased to, or consolidated with such railroad or system between July 1, 1914, and December 31, 1917, both inclusive, and separate operating returns to the Interstate Commerce Commission were not made for such lines after such acquisition, lease, or consolidation, there shall (before the average is computed) be added to the total railway operating income of such railroad or system for the three years ended June 30, 1917, the total railway operating income of the lines so acquired, leased, or consolidated, for the period beginning July 1, 1914, and ending on the date of such acquisition, lease, or consolidation, or on December 31, 1917, whichever is the earlier. The average annual railway operating income shall be ascertained by the Interstate Commerce Commission and certified by it to the President. Its certificate shall, for the purpose of such agreement, be taken as conclusive of the amount of such average annual railway operating income.

War Taxes Deducted

"Every such agreement shall provide that any Federal taxes under the act of October 3, 1917, or acts in addition thereto or in amendment thereof, commonly called war taxes, assessed for the period of Federal control beginning January 1, 1918, or any part of such period, shall be paid by the carrier out of its own funds, or shall be charged against or deducted from the just compensation; that other

taxes assessed under Federal or any other governmental authority for the period of Federal control or any part thereof, either on the property used under such Federal control or on the right to operate as a carrier, or on the revenues or any part thereof derived from operation (not including, however, assessments for public improvements or taxes assessed on property under construction, and chargeable under the classification of the Interstate Commerce Commission to investment in road and equipment), shall be paid out of revenues derived from railway operations while under Federal control; that all taxes assessed under Federal or any other governmental authority for the period prior to January 1, 1918, whenever levied or payable, shall be paid by the carrier out of its own funds, or shall be charged against or deducted from the just compensation.

"Every such agreement shall also contain adequate and appropriate provisions for the maintenance, repair, renewals, and depreciation of the property, for the creation of any reserves or reserve funds found necessary in connection therewith, and for such accounting and adjustments of charges and payments, both during and at the end of Federal control as may be requisite in order that the property of each carrier may be returned to it in substantially as good repair and in substantially as complete equipment as it was in at the beginning of Federal control, and also that the United States may, by deductions from the just compensations or by other proper means and charges, be reimbursed for the cost of any additions, repairs, renewals, and betterments to such property not justly chargeable to the United States; in making such accounting and adjustments, due consideration shall be given to the amounts expended or reserved by each carrier for maintenance, repairs, renewals, and depreciation during the three years ended June 30, 1917, to the condition of the property at the beginning and at the end of Federal control and to any other pertinent facts and circumstances.

"The President is further authorized in such agreement to make all other reasonable provisions, not inconsistent with the provisions of this act or of the act entitled 'An act making appropriations for the support of the Army for the fiscal year ending June 30, 1917, and for other purposes,' approved August 29, 1916, that he may deem necessary or proper for such Federal control or for the determination of the mutual rights and obligations of the parties to the agreement arising from or out of such Federal control.

"If the President shall find that the condition of any carrier was during all or a substantial portion of the period of three years ended June 30, 1917, because of non-operation, receivership, or where recent expenditures for additions or improvements or equipment were not fully reflected in the operating railway income of said three years or a substantial portion thereof, or because of any undeveloped or abnormal conditions, so exceptional as to make the basis of earnings hereinabove provided for plainly inequitable as a fair measure of just compensation, then the President may make with the carrier such agreement for such amount as just compensation as under the circumstances of the particular case he shall find just.

Short Lines Included

"That every railroad not owned, controlled, or operated by another carrier company, and which has heretofore competed for traffic with a railroad or railroads of which the President has taken the possession, use, and control, or which connects with such railroads and is engaged as a common carrier in general transportation, shall be held and considered as within 'Federal control,' as herein defined, and necessary for the prosecution of the war, and shall be entitled to the benefit of all the provisions of this act: *Provided, however,* That nothing in this paragraph shall be construed as including any street or interurban electric railway which has as its principal source of operating revenue urban, suburban, or interurban passenger traffic, or sale of power, heat and light, or both.

"The agreement shall also provide that the carrier shall accept all the terms and conditions of this act and any regulation or order made by or through the President under authority of this act or of that portion of the act entitled 'An act making appropriations for the support of the Army for the fiscal year ending June 30, 1917, and for other purposes,' approved August 29, 1916, which authorizes the President in time of war to take possession, assume control, and utilize systems of transportation.

"Sec. 2. That if no such agreement is made, or pending the execution of an agreement, the President may nevertheless pay to any carrier while under Federal control an annual amount, payable in reasonable installments, not exceeding 90 per cent of the estimated annual amount of just compensation, remitting such carrier, in case where no agreement is made, for its legal rights for any balance claimed, to the remedies provided in section 3 hereof. Any amount thereafter found due such carrier above the amount paid shall bear interest at the rate of 6 per cent per annum. The acceptance of any benefits under this section shall constitute an acceptance by the carrier of all the provisions of this act and shall obligate the carrier to pay to the United States, with interest at the rate of 6 per cent per annum from a date or dates fixed in proceedings under section 3, the amount by which the sums received under this section exceed the sum found due in such proceedings.

Adjustment of Claims for Compensation

"Sec. 3. That all claims for just compensation not adjusted (as provided in section 1) shall, on the application of the President or of any carrier, be submitted to boards, each consisting of three referees to be appointed by the Interstate Commerce Commission, members of which and the official force thereof being eligible for service on such boards without additional compensation. Such boards of referees are hereby authorized to summon witnesses, require the production of records, books, correspondence, documents, memoranda, and other papers, view properties, administer oaths, and may hold hearings in Washington and elsewhere, as their duties and the convenience of the parties may require. In case of disobedience to a subpœna the board may invoke the aid of any district court of the United States in requiring the attendance and testimony of witnesses and the production of documentary evidence, and such court within the jurisdiction of which such inquiry is carried on may, in case of contumacy or refusal to obey a subpœna issued to any person, corporation, partnership, or association, issue an order requiring appearance before the board, or the production of documentary evidence if so ordered, or the giving of evidence touching the matter in question; and any failure to obey such order of the court may be punished by such court as a contempt thereof. Such cases may be heard separately or together or by classes, by such boards as the Interstate Commerce Commission in the first instance, or any board of referees to which any such cases shall be referred may determine. Said boards shall give full hearings to such carriers and to the United States; shall consider all the facts and circumstances, and shall report as soon as practicable in each case to the President the just compensation, calculated on an annual basis and otherwise in such form as to be convenient and available for the making of such agreement as is authorized in section 1. The President is authorized to enter into an agreement with such carrier for just compensation upon a basis not in excess of that reported by such board, and may include therein provisions similar to those authorized under section 1. Failing such agreement, either the United States or such carrier may file a petition in the Court of Claims for the

purpose of determining the amount of such just compensation, and in the proceedings in said court the report of said referees shall be prima facie evidence of the amount of just compensation and of the facts therein stated. Proceedings in the Court of Claims under this section shall be given precedence and expedited in every practicable way.

"Sec. 4. That the just compensation that may be determined as hereinbefore provided by agreement or that may be adjudicated by the Court of Claims, shall be increased by an amount reckoned at a reasonable rate per centum to be fixed by the President upon the cost of any additions and betterments, less retirements, and upon the cost of road extensions to the property of such carrier made by such carrier with the approval of or by order of the President while such property is under Federal control.

"Sec. 5. That no carrier while under Federal control shall, without the prior approval of the President, declare or pay any dividend in excess of its regular rate of dividends during the three years ended June 30, 1917: *Provided, however,* That such carriers as have paid no regular dividends or no dividends during said period may, with the prior approval of the President, pay dividends at such rate as the President may determine.

The Revolving Fund

"Sec. 6. That the sum of $500,000,000 is hereby appropriated, out of any moneys in the Treasury not otherwise appropriated, which, together with any funds available from any operating income of said carriers, may be used by the President as a revolving fund for the purpose of paying the expenses of the Federal control, and so far as necessary the amount of just compensation, and to provide terminals, motive power, cars, and other necessary equipment, such terminals, motive power, cars, and equipment to be used and accounted for as the President may direct and to be disposed of as Congress may hereafter by law provide.

"The President may also make or order any carrier to make any additions, betterments, or road extensions, and to provide terminals, motive power, cars, and other equipment necessary or desirable for war purposes or in the public interest on or in connection with the property of any carrier. He may from said revolving fund advance to such carrier all or any part of the expense of such additions, betterments, or road extensions, and to provide terminals, motive power, cars, and other necessary equipment so ordered and constructed by such carrier or by the President, such advances to be charged against such carrier and to bear interest at such rate and be payable on such terms as may be determined by the President, to the end that the United States may be fully reimbursed for any sums so advanced.

"Any loss claimed by any carrier by reason of any such additions, betterments, or road extensions so ordered and constructed may be determined by agreement between the President and such carrier; failing such agreement the amount of such loss shall be ascertained as provided in section 3 hereof.

"From said revolving fund the President may expend such an amount as he may deem necessary or desirable for the utilization and operation of canals, or for the purchase, construction, or utilization and operation of boats, barges, tugs, and other transportation facilities on the inland, canal, and coastwise waterways, and may in the operation and use of such facilities create or employ such agencies and enter into such contracts and agreements as he shall deem in the public interest.

President May Purchase Securities

"Sec. 7. That for the purpose of providing funds requisite for maturing obligations or for other legal and proper expenditures, or for reorganizing railroads in receivership, carriers may, during the period of Federal control, issue such bonds, notes, equipment trust certificates, stock, and other forms of securities, secured or unsecured by mortgage, as the President may first approve as consistent with the public interest. The President may, out of the revolving fund created by this act, purchase for the United States all or any part of such securities at prices not exceeding par, and may sell such securities whenever in his judgment it is desirable at prices not less than the cost thereof. Any securities so purchased shall be held by the Secretary of the Treasury, who shall, under the direction of the President, represent the United States in all matters in connection therewith in the same manner as a private holder thereof. The President shall each year as soon as practicable after January 1, cause a detailed report to be submitted to the Congress of all receipts and expenditures made under this section and section 6 during the preceding calendar year.

"Sec. 8. That the President may execute any of the powers herein and heretofore granted him with relation to Federal control through such agencies as he may determine, and may fix the reasonable compensation for the performance of services in connection therewith, and may avail himself of the advice, assistance, and co-operation of the Interstate Commerce Commission and of the members and employees thereof, and may also call upon any department, commission, or board of the government for such services as he may deem expedient. But no such official or employee of the United States shall receive any additional compensation for such services except as now permitted by law.

"Sec. 9. That the provisions of the act entitled 'An act making appropriations for the support of the Army for the fiscal year ending June 30, 1917, and for other purposes,' approved August 29, 1916, shall remain in force and effect except as expressly modified and restricted by this act; and the President, in addition to the powers conferred by this act, shall have and is hereby given such other and further powers necessary or appropriate to give effect to the powers herein and heretofore conferred. The provisions of this act shall also apply to any carriers to which Federal control may be hereafter extended.

"Sec. 10. That carriers while under Federal control shall be subject to all laws and liabilities as common carriers, whether arising under State or Federal laws or at common law, except in so far as may be inconsistent with the provisions of this act or any other act applicable to such Federal control or with any order of the President. Actions at law or suits in equity may be brought by and against such carriers and judgments rendered as now provided by law; and in any action at law or suit in equity against the carrier, no defense shall be made thereto upon the ground that the carrier is an instrumentality or agency of the Federal government. Nor shall any such carrier be entitled to have transferred to a Federal court any action heretofore or hereafter instituted by or against it, which action was not so transferable prior to the Federal control of such carrier; and any action which has heretofore been so transferred because of such Federal control or of any act of Congress or official order or proclamation relating thereto shall upon motion of either party be retransferred to the court in which it was originally instituted. But no process, mesne or final, shall be levied against any property under such Federal control.

The Rate-Making Power

"That during the period of Federal control, whenever in his opinion the public interest requires, the President may initiate rates, fares, charges, classifications, regulations, and practices by filing the same with the Interstate Commerce

Commission, which said rates, fares, charges, classifications, regulations, and practices shall not be suspended by the commission pending final determination.

"Said rates, fares, charges, classifications, regulations, and practices shall be reasonable and just and shall take effect at such time and upon such notice as he may direct, but the Interstate Commerce Commission shall, upon complaint, enter upon a hearing concerning the justness and reasonableness of so much of any order of the President as establishes or changes any rate, fare, charge, classification, regulation, or practice of any carrier under Federal control, and may consider all the facts and circumstances existing at the time of the making of the same. In determining any question concerning any such rates, fares, charges, classifications, regulations, or practices, or changes therein, the Interstate Commerce Commission shall give due consideration to the fact that the transportation systems are being operated under a unified and co-ordinated national control and not in competition.

"After full hearing the commission may make such findings and orders as are authorized by the act to regulate commerce as amended, and said findings and orders shall be enforced as provided in said act: *Provided, however,* That when the President shall find and certify to the Interstate Commerce Commission that in order to defray the expenses of Federal control and operation fairly chargeable to railway operating expenses, and also to pay railway tax accruals other than war taxes, net rents for joint facilities and equipment, and compensation to the carriers, operating as a unit, it is necessary to increase the railway operating revenues, the Interstate Commerce Commission in determining the justness and reasonableness of any rate, fare, charge, classification, regulation, or practice shall take into consideration said finding and certificate by the President, together with such recommendations as he may make.

Penalties

"Sec. 11. That every person or corporation, whether carrier or shipper, or any receiver, trustee, lessee, agent, or person acting for or employed by a carrier or shipper, or other person, who shall knowingly violate or fail to observe any of the provisions of this act, or shall knowingly interfere with or impede the possession, use, operation, or control of any railroad property, railroad, or transportation system hitherto or hereafter taken over by the President, or shall knowingly violate any of the provisions of any order or regulation made in pursuance of this act, shall be guilty of a misdemeanor, and shall, upon conviction, be punished by a fine of not more than $5,000, or, if a person, by imprisonment for not more than two years, or both. Each independent transaction constituting a violation of, or a failure to observe, any of the provisions of this act, or any order entered in pursuance hereof, shall constitute a separate offense. For the taking or conversion to his own use or the embezzlement of money or property derived from or used in connection with the possession, use, or operation of said railroads or transportation system, the criminal statutes of the United States, as well as the criminal statutes of the various States where applicable, shall apply to all officers, agents, and employees engaged in said railroad and transportation service, while the same is under Federal control, to the same extent as to persons employed in the regular service of the United States. Prosecutions for violations of this act or of any order entered hereunder shall be in the district courts of the United States, under the direction of the Attorney General, in accordance with the procedure for the collection and imposing of fines and penalties now existing in said courts.

"Sec. 12. That moneys and other property derived from the operation of the carriers during Federal control are hereby declared to be the property of the United States. Unless otherwise directed by the President, such moneys shall not be covered into the Treasury, but such moneys and property shall remain in the custody of the same officers, and the accounting thereof shall be in the same manner and form as before Federal control. Disbursements therefrom shall, without further appropriation, be made in the same manner as before Federal control and for such purposes as under the Interstate Commerce Commission classification of accounts in force on December 27, 1917, are chargeable to operating expenses or to railway tax accruals and for such other purposes in connection with Federal control as the President may direct, except that taxes under Titles 1 and 2 of the act entitled 'An act to provide revenue to defray war expenses, and for other purposes,' approved October 3, 1917, or any act in addition thereto or in amendment thereof, shall be paid by the carrier out of its own funds. If Federal control begins or ends during the tax year for which any taxes so chargeable to railway tax accruals are assessed, the taxes for such year shall be apportioned to the date of the beginning or ending of such Federal control, and disbursements shall be made only for that portion of such taxes as is due for the part of such tax year which falls within the period of Federal control.

"At such periods as the President may direct, the books shall be closed and the balance of revenues over disbursements shall be covered into the Treasury of the United States to the credit of the revolving fund created by this act. If such revenues are insufficient to meet such disbursements, the deficit shall be paid out of such revolving fund in such manner as the President may direct.

"Sec. 13. That all pending cases in the courts of the United States affecting railroad or other transportation systems brought under the act to regulate commerce, approved February 4, 1887, as amended and supplemented, including the commodities clause, so called, or under the act to protect trade and commerce against unlawful restraints and monopolies, approved July 2, 1890, and amendments thereto, shall proceed to final determination as soon as may be, as if the United States had not assumed control of transportation systems; but in any such case the court having jurisdiction may, upon the application of the United States, stay execution of final judgment or decree until such time as it shall deem proper.

Period of Federal Control

"Sec. 14. That the Federal control of railroads and transportation systems herein and heretofore provided for shall continue for and during the period of the war and for a reasonable time thereafter, which shall not exceed one year and nine months next following the date of the proclamation by the President of the exchange of ratifications of the treaty of peace: *Provided, however,* That the President may, prior to July 1, 1918, relinquish control of all or any part of any railroad or system of transportation, further Federal control of which the President shall deem not needful or desirable; and the President may at any time during the period of Federal control agree with the owners thereof to relinquish all or any part of any railroad or system of transportation. The President may relinquish all railroads and systems of transportation under Federal control at any time he shall deem such action needful or desirable. No right to compensation shall accrue to such owners from and after the date of relinquishment for the property so relinquished.

"Sec. 15. That nothing in this act shall be construed to amend, repeal, impair, or affect the existing laws or powers of the States in relation to taxation or the lawful police regulations of the several States, except wherein such laws, powers, or regulations may affect the transportation of troops, war materials, government supplies, or the issue of stocks and bonds: *Provided, however,* That no State or subdivision thereof, or the District of Columbia, shall levy,

assess, or collect an amount of taxes from railroad property within the State or subdivision thereof, or the District of Columbia, while under Federal control, in excess of the ratio which the taxes derived from railroad property bore to the total taxes of such State or subdivision thereof, or the District of Columbia, for the year previous to Federal control.

"Sec. 16. That this act is expressly declared to be emergency legislation enacted to meet conditions growing out of war; and nothing herein is to be construed as expressing or prejudicing the future policy of the Federal government concerning the ownership, control, or regulation of carriers or the method or basis of the capitalization thereof."

The conferees adopted the bill as passed by the House as the basis for their work and the bill as submitted for final action was in the form of an amendment to the House bill. In several cases in order to reach a new agreement the conferees wrote language into the act which was in neither bill, as in the case of the compromise on a period of 21 months after the war and in the case of the rate-making section. As a result, the Senate on March 8 adopted a resolution directed against the practice of inserting new matter in such reports.

The Senate receded from its disagreement to section one of the House bill with an amendment striking out so much of the House bill as provided an increase of the annual sum payable as compensation to the carriers upon the cost of additions or betterments, less retirements, or road extensions made during the six months ended December 31, 1917, and with further slight amendments of the wording of the House amendment. The section in the Senate bill which proposed to reduce the compensation by providing that there should be no return on surplus invested during the period of Federal control was omitted.

The Senate receded from its disagreement to section two of the House amendment relating to the compensation of carriers which fail to reach an agreement on the basis of a standard return, with an amendment providing that the compensation that might be agreed upon as provided in that section should cover the time consumed in arriving at an agreement.

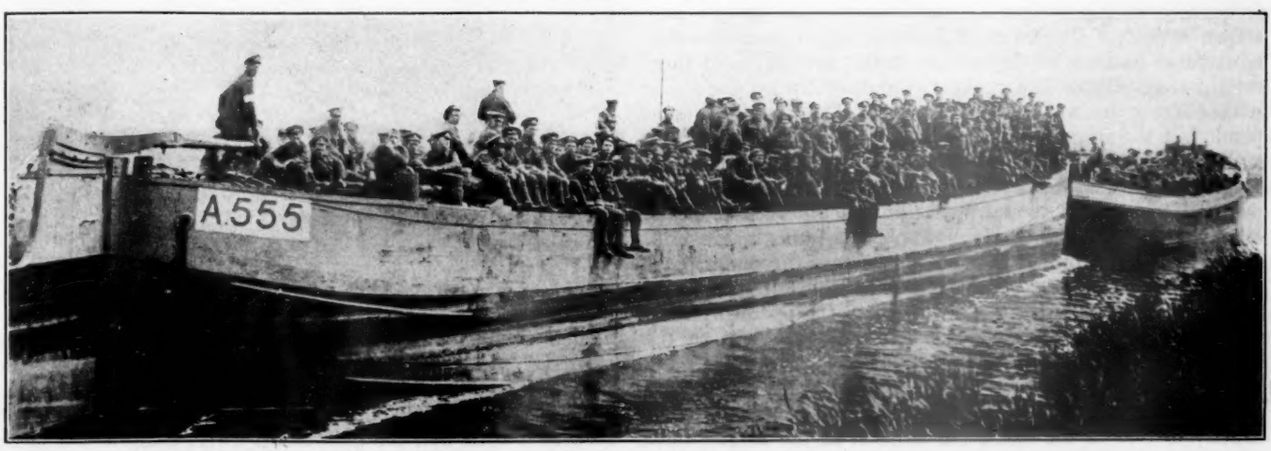
The Senate receded from its disagreement to section 3 with an amendment at the end of the section providing that proceedings in the court of claims should be given precedence and expedited in every practicable way. In section 8 it was agreed to strike out the Lenroot amendment providing that no person employed in connection with the operation of the railroads shall be deemed to be an officer or employee of the United States within the meaning of the war tax and workmen's compensation laws.

Section 9 of the House bill, which made provision regarding the operation of short line railroads not taken over, was stricken from the bill because of the adoption by the House of the Senate provision requiring all lines referred to in the section to be taken over.

Section 11, as agreed upon by the conference, leaves the President practically unrestricted by the laws which have applied to common carriers, except to some extent as to rates. The House bill provided that carriers while under Federal control shall be subject to all laws and liabilities as common carriers, except in so far as may be inconsistent with the provisions of this act or any other act applicable to such Federal control. The substitute agreed upon adds the words of the Senate bill "or with any order of the President." This section was also amended by the new language as to the rate-making power, "the effect of which," the conference report states, "is to give paramount and final power to the Interstate Commerce Commission to determine finally as to the reasonableness and justness of any rates, fares, charges, classifications, regulations and practices that may be initiated by the President during the period of Federal control, with authority to make such findings and orders as the commission may think right and proper with regard thereto."

Representative Cary of Wisconsin has introduced a bill, H. R. 10,550, to provide for national ownership of the railroads.

An effort to obtain the passage of the bill in the Senate on Monday was defeated by Senator Frelinghuysen, who made a point of order against the conference report under the new rule adopted by the Senate on the ground that the conferees had exceeded their authority and had written new matter into the bill in the restriction of state taxing powers. Senator Knox also supported the objection to the tax provision, saying that governors of many states had been assured that the bill would not curtail state taxing powers. Senators Curtis, Johnson of California, Williams and Gallinger also opposed the report for similar reasons and it was finally put over until the next day and again deferred until Wednesday. Senators Smith of South Carolina and Robinson of Arkansas defended the conference report and declared the provision was necessary to protect the federal government against the possibility of excessive state taxation. In the bill as finally passed by the Senate Section 15 was eliminated.



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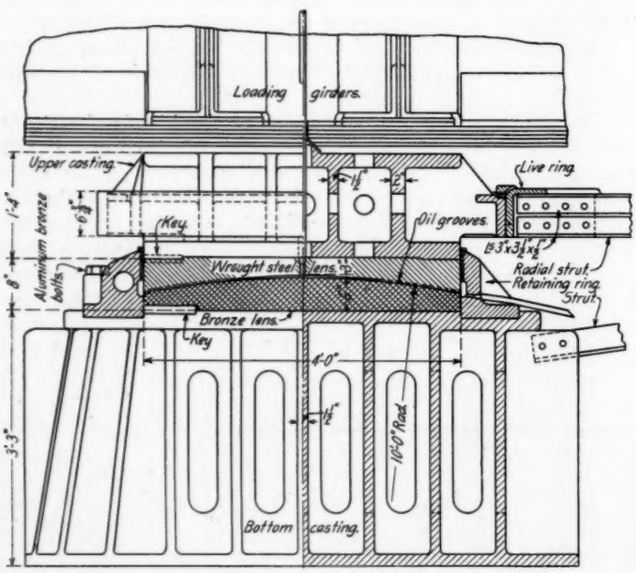
The Tommies Use Them All—Light Railways, Motor Trucks and Canal Barges

New Details for Draw Span Bearings

THE DRAW SPAN of the Chicago, Burlington & Quincy bridge over the Missouri river at Kansas City, is provided with end lifts and a turning center that embody a number of novel features. The bridge is double decked with two railway tracks on the lower level and a highway above. The draw span is 450 ft. long and except for the special features mentioned above may be said to follow current practice. The structure as a whole was described in the *Railway Age Gazette* of June 8, 1917, page 1181.

One of the drawings and the photograph show the details of the end lift. The functions of the end bearing of a swing span are two-fold. It affords the means for raising the end of the bridge as required to change the span from a double cantilever over the pivot pier when open, to a span supported on three piers when closed or vice versa. It must also supply expansion bearings to facilitate changes in the length of the span under varying temperatures or passing loads. This last condition involves a further complication since the device must be equally operative under all positions of the end bearings as determined by the changing length of the span.

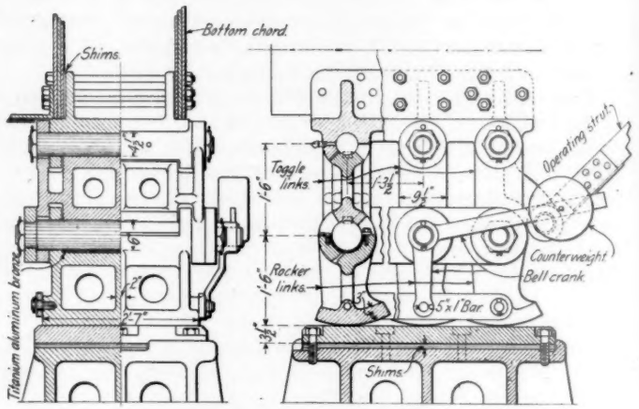
The idea of a rocker connected with the end of the span



Vertical Section of the Center Assembled

by means of a link so as to form a toggle, has been applied frequently in the design of end lifts, but the design here shown embodies a number of features which overcome disadvantages in some of the earlier plans. It consists of three sets of toggle links and rockers connected up on each side with bars to insure parallel motion. The links are suspended at the upper end, by means of a 4½-in. pin, from a steel casting bolted into the end of the bottom chord. The toggle is operated by a structural steel strut connected at one end to a crank in the operating machinery and at the other end to a pin near the lower end of the inside link. When the strut is pulled to the right (toward the center pier) the toggle links and rockers swing in that direction and the end of the bridge is lowered. When the operating strut is pushed to the left, the links and rockers return to the vertical position and the bridge is raised.

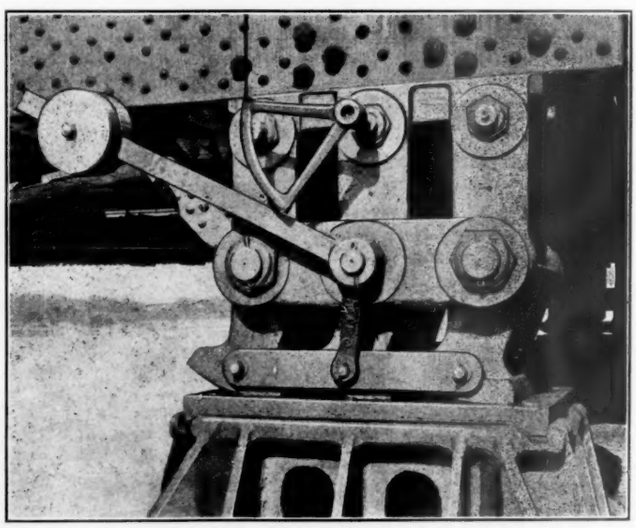
As long as the rockers are in contact with the surface of the bearing on which they rest, their motion corresponds exactly to that of the links, but as soon as the toggles have been swung far enough to clear the span entirely from the bearing, the rockers would have a tendency to hang in a vertical position from the pins that connect them to the toggle links and as a result when the bridge is closed the rockers would come in contact with the bearing while in a vertical position. To overcome this the bell crank and counterweight shown in the drawing were added which cause the rockers to tip up to the left when clear of the bearing and they do not start to right themselves (in raising the bridge) until their roller surfaces come in contact with the bearings as the toggles straighten out. As a result, the angle



Sectional Elevations of the End Lift

between the axis of the toggle links and the surface upon which they roll is always the same at the instant that they come in contact, no matter how much the span may have been shortened or lengthened by temperature changes. The rockers have unusually large radii and are also free to rock under the bridge with changes in the length of the span while the upper links are held in a fixed vertical position by the operating strut.

In the Burlington bridge at Kansas City there are three sets of links as shown in the drawing, but the nature of the design is such that it is capable of indefinite extension and



A View of One End Bearing Complete

as many links may be used as are required for the load to be carried. The dead load under each end of each truss on the Kansas City structure is 160,000 lb., the corresponding live load being 1,600,000 lb. The design of the links and rockers is such that the pins act in direct compression along nearly the entire length. Operating tests of the end lifts, showed that their working efficiency exceeded anticipations.

The center is of the combined center and rim bearing type, one-half of the load of the bridge being on the center which consists essentially of a 48-in. wrought-steel, concave lens turning on a convex aluminum bronze lens of the same diameter, the surface of contact being that of a sphere of 10-ft. radius scraped and ground to fit. The lenses are supported on a cast-steel pedestal and are enclosed by a cast-steel ring, lined with a bronze bushing. This ring is made in halves so that it is taken off readily. With this ring removed it is only necessary to jack the bridge up about ¼ in. and remove two keys in order to take the two lenses out when it becomes necessary to re-grind the surfaces or replace them. All bolts removed in this operation are of titanium aluminum bronze, this metal being used since it insures that the bolts will not corrode in place and make removal difficult.

Just above the upper lens is the upper center casting which is equipped with a cylindrical surface to receive the live ring, to which the radial struts are attached. This is a departure from the usual practice since the live ring is ordinarily turned on the lower center casting. To avoid difficulty in the field the segments of the tread were assembled in the shop together with the lower center casting and the 4-in. by 4-in. angles serving as radial struts to connect them. After all the parts had been assembled to give a true circle for the tread, all bolt holes for the radial struts were reamed and all connections marked so that each member could be reassembled in the identical position.

These and other details of the turning machinery of this bridge were designed by B. B. Carter, consulting engineer, Chicago, under the general direction of the late C. H. Cartlidge, bridge engineer of the Chicago, Burlington & Quincy.

The Director General on Equipment Standardization

Proposed Standards for New Equipment Only. Will Welcome Opportunity for Making Improvements

On March 6, George A. Post, president of the Railway Business Association, interviewed Director General McAdoo on the subject of standardization. The following is a letter sent to the members of the association by Mr. Post telling of this interview:

As president of the Railway Business Association, I have had an extended interview with the director general of railroads, in which was discussed the matter brought to his attention in my letter* to him of February 25—the anxiety felt by manufacturers of railway specialties as to possible consequences to them in any scheme for standardization of equipment. I was received cordially, and was accorded a generous period of time for conference. Mr. McAdoo spoke freely and frankly concerning what he has in mind in seeking establishment of standards.

I submitted two queries as a basis:

"*First*—Are the recently constituted committees on locomotives and cars expected to recommend to the director general standards to be adhered to, not only in the building of the new locomotives and cars, now under consideration for the immediate relief of traffic, but as well to all power and vehicles that may be required during the period that the railways shall remain under the administration of the director general? Also, are such standards, when approved by the director general, to apply and govern in the matter of repairs to equipment during such period?

"*Second*—During the period that the railways are under the control of the director general, will it be considered so important to adhere rigidly to any standard that may be now approved, as to cause a cessation of trial, development and acceptance of any new mechanical inventions intended to improve and economize railway operation?"

With these two questions propounded for his consideration, Mr. McAdoo proceeded to express his ideas responsive thereto. I do not attempt to record fully his exact language, but to condense, animated by an eager desire to report faithfully and fairly the viewpoint of the director general:

Mr. McAdoo on Railway Standards

As director general of railroads, it is his duty to see that our railroads are put in condition to perform with the highest degree of efficiency possible the vital part they must play in winning the war. That their performance thus far has not met the requirements is a fact known to everybody. They must have, as quickly as possible, among other things, large additions to their power and rolling stock. The purchase of such equipment will call for the expenditure of vast sums. The natural thought of an official responsible for such expenditure, and for the least possible delay in delivery of sadly needed locomotives and cars is: "To what extent may they be standardized?" As a matter of general knowledge, Mr. McAdoo was aware that the American Railway Association, made up of the railway executives of the country, had for several years had committees at work for the accomplishment of standardization, so that it was clear the subject was a live one with railway administrators long before the roads were taken over by the government under stress of war. The roads had not agreed when the change of control occurred.

When Mr. McAdoo assumed the directorship, the roads were taken over as going concerns, and their official personnel was not disturbed, except as he has called upon some of the gentlemen of distinction in their service to become members of his official staff. When he sought to be advised as to how far standardization of equipment might be effected, he caused to be appointed committees made up of locomotive and car builders and railway mechanical officials, representative of the regional districts which had been created.

Mr. McAdoo disclaims being a railroad man, and is utilizing the forces he finds at hand to suggest what ought to and may be done in the solution of this particular railway problem. He has laid down no rules for their conferences, has no preconceived notions, and has given his advisors free rein. No reports or recommendations from them have yet been received by him (March 6).

Whether he will approve of all their recommendations when received, he does not know, of course, but this he would like the manufacturers of railway material, as represented by the Railway Business Association, to appreciate, namely—that any embarrassments, losses, or necessary expenditures for the purpose of adaptation to the new standards will be entailed not by his personal initiative or prescription, but as the consensus of opinion of those with whom they have heretofore done business and to meet the exigent requirements of war conditions. If the railroad executives had formulated standards before the war, manu-

*Railway Age, March 1, page 457.

facturers would have been obliged to endure and adapt themselves to the changes ordained by their customers.

Of course, he went on, there can be no such thing as a permanent standard for railway practice. America and progress are synonymous terms. The old gives place to the new in the onward march of progress. There was never a time when the inventive genius of our nation so needed to be working at highest speed as now. No matter what may be established as a standard for new equipment under the present pressure for celerity of manufacture and attainment of economy he would hope and expect that when future requirements shall confront us, the inventor and progressive manufacturer will offer improvements of great value, to be welcomed as aids to economical and efficient railway operation.

During the period that the roads shall remain under governmental control, it will be the determination of the officials in charge that our railroads shall be made better than ever before. Anybody who has plans to suggest for improvement will be hospitably received.

The proposed standards are for the immediate present, and for new equipment to be purchased. They will not apply to existing equipment, which must be kept in repair with parts already intended for such repairs. It would be folly to prescribe that cars requiring repairs must await the arrival of new standard parts, instead of being repaired with specialties already in stock, or easily obtained from the manufacturers.

Accepting the figures presented by the Railway Business Association, for the purpose of his comment, there are now in use and under maintenance 63,862 locomotives and 2,326,-987 cars. No one would consider it wise to do anything save keeping them in service as long as they can be made to last by the use in their repair of such devices as were originally used in their construction. In so doing there would be a continuing demand for such stocks of supplies as the manufacturers keep on hand to meet requirements.

Mr. McAdoo can see no reason for the manufacturers of railway material and equipment to be filled with fear for their future. They should, on the contrary, take counsel of their hopes. He expects to see them doing a greater volume of business than in recent years and at a fair profit. There will be no trouble for any manufacturer who is willing to do business at a fair price.

Members of Railroad Administration Staff Resign Railroad Offices

ALL MEMBERS OF THE STAFF of the Railroad Administration at Washington have severed their connections with all railroad companies and other corporate or private interests and are devoting themselves exclusively to the service of the government, according to an announcement by Director General McAdoo.

Walker D. Hines, assistant to the director general, has tendered his resignation as chairman, general counsel, and director of the Atchison, Topeka & Santa Fe. Carl R. Gray, director of the division of transportation, has tendered his resignation as president, chairman and director of the Western Maryland, and as chairman and director of the Wheeling & Lake Erie. Edward Chambers, director of the division of traffic, has tendered his resignation as vice-president of the Atchison, Topeka & Santa Fe. As heretofore stated, R. S. Lovett, director of the Division of Capital Expenditures, has already severed his connection with various railroad companies.

The announcement applies also to the various assistants to the members of Mr. McAdoo's cabinet, who are railroad men; but not to the regional directors. Heretofore the salaries of members of the staff have been paid by the railroad companies but it is understood that they will now be placed on the government payrolls and will be paid presumably from the revolving fund, which, according to the provision of the bill, may be used "for the purpose of paying the expenses of the federal control."

A Novel Arch Viaduct

THE ACCOMPANYING PHOTOGRAPH shows a combination of a structural steel viaduct following the lines of usual viaduct practice combined with a spandrel-braced steel arch, the design representing the solution of the special problem presented by the local situation. The structure is known as the Dead River arch, a few miles from Marquette, Mich., on the Lake Superior & Ishpeming, which handles ore from mines at Ishpeming and vicinity to the ore docks at Marquette.

The structure shown replaces a lighter steel trestle where it crosses a gorge of the small river at an acute angle and on a grade of 1.63 per cent. As it was necessary to replace the existing structure under traffic, it was found expedient to design the new bridge to clear the old one and as there is a considerable fall in the stream directly under the crossing

Combination of an Arch and a Viaduct

so that the stream is very turbulent, particularly during high water, the use of falsework would have been very expensive if not hazardous at the season of the year when the reconstruction was in progress. In consequence an arch was decided upon with a span of 116 ft. and a rise of 70 ft., and with the track at an additional elevation above the crown of the arch of 28 to 30 ft. In a preliminary design the arch was made only 50 ft. high, but this did not work out well on account of the high tractive forces set up in the high trestle bents on top of the arch. The bridge was fabricated and erected by the Wisconsin Bridge & Iron Company, Milwaukee, Wis., under the general direction of R. C. Young, chief engineer of the Lake Superior & Ishpeming, Marquette, Mich.

Refrigerator Cars for the Michigan Central

The Design Represents the Most Modern Practice, Special Attention Being Given the Insulation

A SHORT TIME AGO the Michigan Central received 250 refrigerator cars which represent the latest development in the construction of this class of equipment. These cars were built by the Merchants Despatch Transportation Company at East Rochester, N. Y. They are 41 ft. long and weigh 51,500 lb., having a rated capacity of 70,000 lb.

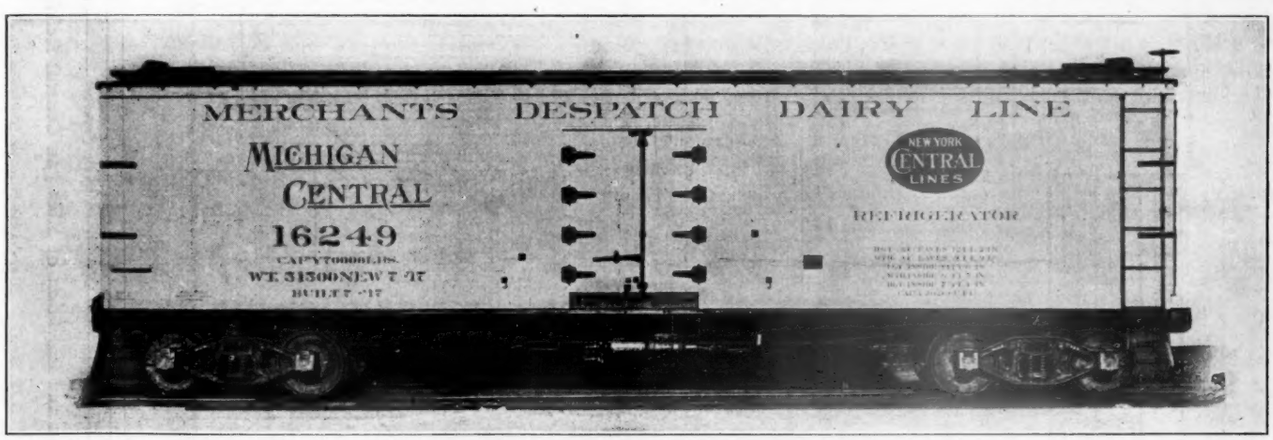
The cars are particularly well insulated, slab cork being used in the floors and below the sub-belt rail on the sides and ends. The sides are insulated with four layers of ½-in. insulation and the ceiling has five layers, the layers being applied with no air space between them. The method of insulating these cars was adopted after making extensive tests with the different methods of application. It was applied so as to eliminate as much as possible all dead air spaces. It has been found difficult to maintain a tight car with the courses of insulation separated, as the constant weaving of the car causes a circulation of air in the supposed dead air space. By placing the various courses of insulation close together, the construction of the car is simplified and the insulation can be supported better. The post and over the side sills at the door opening. This extends 16 in. up on the side framing. A layer of burlap plastic is then laid over the sills of the car and extends up 6 in. on the sides. Another layer of burlap plastic is laid over the 1¾-in. flooring, extending up 6 in. on the car framing, and on top of this is placed the top course of flooring.

The carlines are mortised into the side plates and are held in position by ½-in. tie rods, extending between the side plates and set flush with the face of the carline. The XLA outside metal roof, made by the Standard Railway Equipment Company, is used on these cars. The roof boards and the ceiling are 13/16 in. thick.

Insulation

The insulation in the floor is made up of 2-in. corkboard laid on a 13/16-in. false floor between the sills. The cork is held in place by 1-in. nailing strips. Zero compound is then placed over the cork, making a perfect seal.

The outside of the car framing is covered with a layer of ⅜-in. shiplap pine. Over this is applied a layer of three-ply 90-lb. waterproof paper extending from side sill to side plate. Sub-belt rails 2½ in. by 1¾ in. are then applied over the belt rails. Between the lower sub-belt rail and the side sill 2-in. corkboard is applied, the faces of the board being dipped in hot Hydrex compound before being applied.



Refrigerator Car for the Michigan Central

ice tanks are of M. D. T. standard construction, which was adopted a few years ago. The ice is held in wire screens in the inside of the tank. An air space of 2 in. is left between this screen and the walls of the tank on all sides, which permits free circulation of air around the ice and through the tanks to the base. An insulated bulkhead is used to prevent cooling of the perishable freight near the bulkhead to a lower temperature than is obtained in other parts of the car. Floor racks are provided to allow free circulation of the air under the lading.

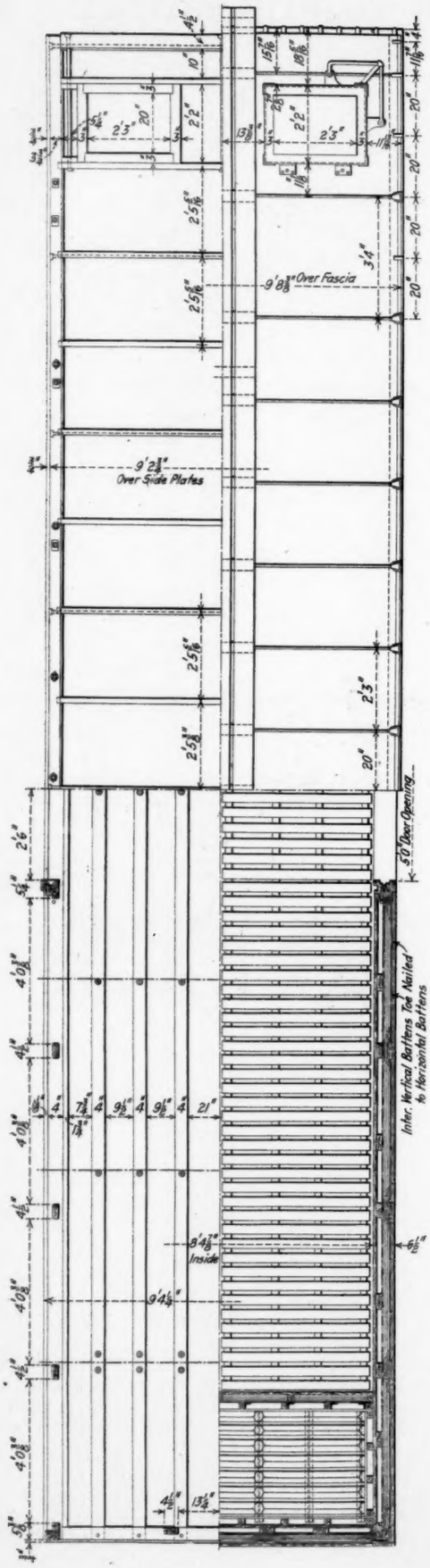
Underframe and Side Framing

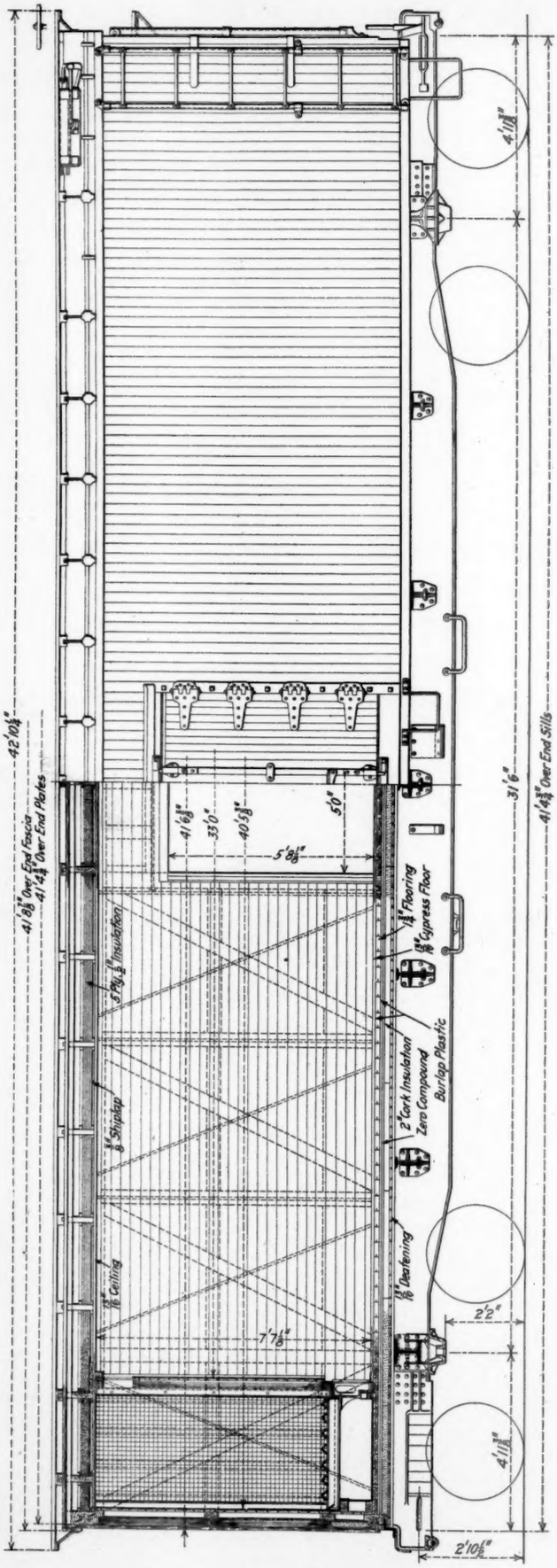
These cars are provided with the Bettendorf steel underframe, which is 41 ft. 4¾ in. over end sills. This underframe supports two side sills and six intermediate sills 5½ in. wide by 4 in. thick. Three-quarter inch diagonal rods criss-cross the diagonal braces, as indicated in the drawings.

The siding and the inside lining are 13/16 in. thick, and the flooring is 1¾ in. thick. Before applying the floor, the side framing is lined with a special waterproofing which extends from the inside face of the corner post to the door

The four-ply, ½-in. insulation is applied en masse between the belt rails and the side plates. The insulation is held in place by ¼-in. round nailing strips. Battens are placed at each intermediate post, corner post, door post and belt rails and an additional batten is applied in each panel formed by the vertical battens, belt rails and side plate filler to more securely support the insulation. Two-ply wool felt is applied immediately on top of the battens, and on top of this is applied a layer of three-ply, 90-lb. waterproof paper extending from the top of the side plate to the bottom of the side sill and from door post to door post around the ends of the car. The siding is applied on top of this.

The roof of the car is insulated with five layers of ½-in. insulation applied to a ⅜-in. false ceiling, separated from the ceiling by 1-in. by 1-in. nailing strips. The insulation is held in place by 1-in. by 1-in. nailing strips, as indicated



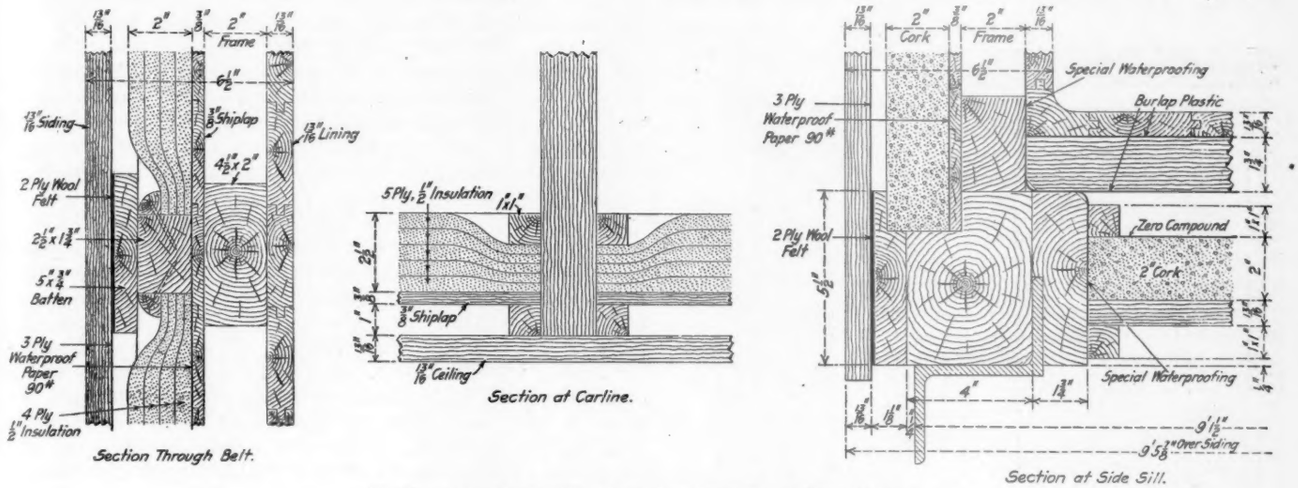


Plan and Elevation of Michigan Central Refrigerator Car

in the illustrations. A layer of burlap plastic is applied between the metal roof and the roof boards.

Ice Compartments

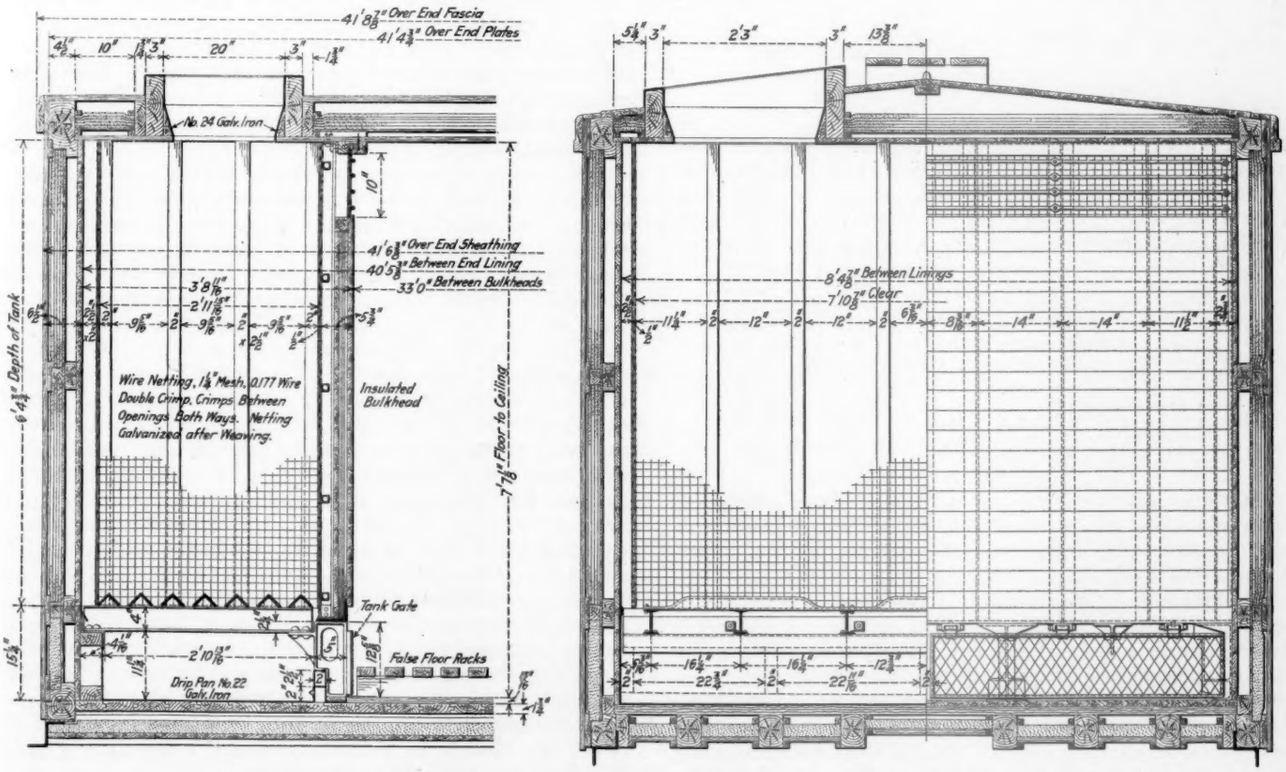
The ice compartments are 3 ft. long by 7 ft. 11 in. wide. The sides and ends of the car are lined with No. 24 galvanized iron to a height of 30 in. The ice grate frame is 2-in. by 2-in. by ¼-in. galvanized angles, which are riveted to the bulkhead base at the bottom and bolted to a reinforcing angle through the ceiling at the top. To the intermediate bulkhead posts are bolted 2-in. by 2⅛-in. furring strips, on which is laid a 13/16-in. bulkhead lining. Four layers of ½-in. insulation protect the lading next the bulkhead from too low temperature.



Various Sections Showing Application of Insulation

made up of malleable iron and commercial shapes. There are six 4-in., 7.5-lb. galvanized I-beam supports for the grate bars. The ice grates are 2¾ in. by 2¾ in. by ¼

The bulkhead top rail is 2 in. by 2 in., extending the full width of the bulkhead, being nailed to the bulkhead post furring strips. The outside lining is 13/16 in., which is



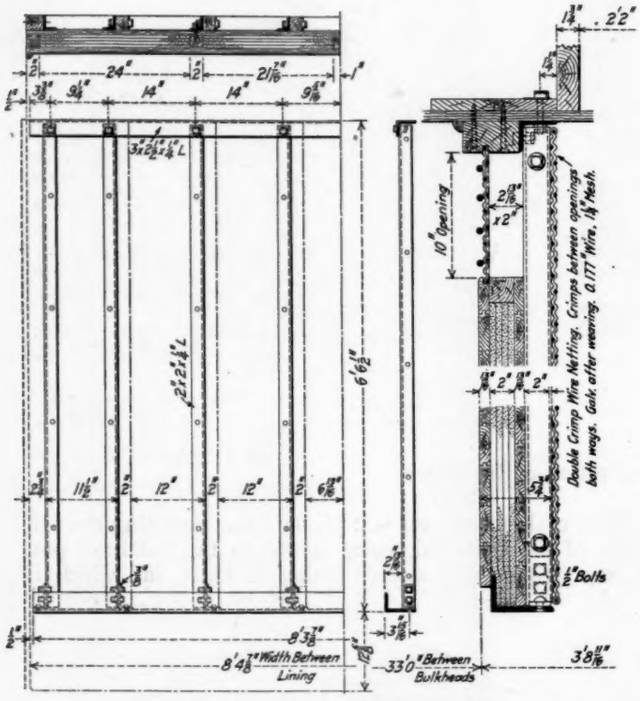
Arrangement and Design of Ice Compartments, Michigan Central Refrigerator Car

in. galvanized angles set with the corner up, as indicated in the drawings. The bulkhead is supported on a galvanized 5-in. by 3½-in. by ⅜-in. angle, which is bolted to the malleable base casting. There are eight bulkhead posts of nailed to 2-in. by 2-in. furring strips in the bulkhead. An opening 10 in. wide is provided at the top and an opening 12⅝ in. wide is provided at the bottom of the bulkhead.

The tank screen is made up of 0.177 wire with a 1¼-in.

mesh. The netting on the side and rear of the tank is fastened to oak furring strips and at the front it is secured to the bulkhead post furring strips. The tank covers are insulated with four layers of ½-in. insulation. The openings in the roof are 20 in. by 27 in.

The opening at the bottom of the bulkhead is covered with a gate of 1½-in. diamond mesh made up of 0.177 wire, which is mounted on a frame of ⅞-in. by 7/16-in. channels. These gates are fastened to the angle bulkhead



Construction of the Solid Bulkhead

support by hinges. At the top a similar netting is used with four ½-in. rods applied as indicated in the drawings.

Among the specialties used on this car may be mentioned Miner roller side bearings, Western angle cock holder and card holder, Bettendorf trucks and Virginia dust guards.

The following are the general dimensions of this car:

Length over end sills	41 ft. 4¾ in.
Length inside of lining	40 ft. 5⅜ in.
Distance between ice tanks	33 ft.
Width over outside sheathing	9 ft. 5⅞ in.
Width inside of lining	8 ft. 4⅞ in.
Width over side fascia	9 ft. 9⅛ in.
Width of door opening	5 ft.
Height from rail to eaves	12 ft. 2⅛ in.
Height from rail to over all	13 ft. 8⅝ in.
Height from top of floor to ceiling	7 ft. 7⅛ in.
Cubic feet capacity	2,026

AMERICAN EQUIPMENT AT CHILEAN IRON MINE.—Under the name of the Bethlehem Chile Iron Mines Company, the Bethlehem Steel Company operates the iron mines at Tofo, near Coquimbo, Chile. In order to get the ore out on a large scale it has installed a complete modern plant, the most important features of which are the loading dock and the electric railway for taking supplies up to the mine and bringing down the ore. From the trains the ore is dumped upon a storage space on the ground or into the bins of the dock, if the latter are empty. The locomotives that are to haul the trains will run on both 2,400 and 1,200 volts and will employ regenerative braking on the trip down hill, the distance being 24 kilometers (16 miles), with a uniform grade of 4 per cent all the way. Three will be required, and all will be of the type used in the recent Chicago, Milwaukee & St. Paul electrification.—*Commerce Reports.*

An Engineman Doing His Bit*

By Edward F. McKenzie

Passenger Engineman, Pittsburgh Division, Pennsylvania Railroad

WHEN OUR BELOVED COUNTRY entered the war for humanity, I resolved to do everything in my power to help win the war; and, as a beginning, I took council with my wife and son as to how we could do the most good. The first consideration was the elimination of all unnecessary expense and waste. We had planned a vacation to Atlantic City; this was given up at once. Upon looking over our wardrobes, it was decided that last winter's suits would be good enough for this winter. Next, we considered economizing on food, and have worked out the following program for the table:

Meat, two days a week; fish, two days a week, and the other days, beans, soups, macaroni, etc. We use wheat (whole wheat), corn and rye bread in turn. We frequently have mush and milk for evening dinner, and fry what remains for breakfast the following day. The stock of all meat is used in soups; the fryings of all salt meat and pork are used to fry other foods. As breakfast foods, we use oats, corn cakes and buckwheat cakes, alternately. Our rule is never to have more than one heavy meal a day—breakfast and lunch being light. Fruit and vegetables are used at all meals. This program gives a well-balanced diet, keeping us in good health.

I cultivated a war garden in my spare hours which supplied our wants all summer, in addition to a good supply for winter. The money saved by such methods was considerable, and enabled me to join the Red Cross and contribute liberally to it and to the Y. M. C. A. fund, as well as all church and hospital funds that have been presented to me. I purchased a Liberty Bond in the first and also the second issues from my earnings, authorizing the Railroad company to take 10 per cent each month from my earnings; and I am adding to my savings to purchase more when some other men may not be able to buy them. I have also advised other employees to do the same.

I read up on American citizenship and have missed no opportunity to talk to foreign-born men, and show them the advantage of being citizens and supporting the government where they make their living, and have allayed their fears as to any bodily harm that might come to them, or the confiscation of their money, and have advised them to go about their work as usual and not talk too much.

Being a passenger engineman, I next gave thought as to how I could best serve the government while at my work, as I realized that military affairs depend to a large extent on the railroads of the country, on transportation of men, munitions and supplies, as well as keeping the mills and plants which manufacture these supplies working to full capacity. Knowing these facts, I first wrote to our road foreman of engines and to our general superintendent, tendering my services in any capacity in which I could be of most service to the company and to the nation, holding myself ready at all times, although on a regular run.

I go to work one-half hour earlier than required by the company in order that I may give the engine a most thorough inspection and have it in perfect condition when starting, as a break-down on the road means delay—one of the things not desired.

And at the close of each day I ask God to bless our armies and to endow our President and his cabinet with wisdom, that they may be the instruments in God's hands to bring the war to a successful end for humanity and democracy.

*Reprinted from a pamphlet issued by the Pennsylvania Railroad. Mr. McKenzie was the author of the first prize paper on locomotive running, which was printed in the *Railway Age Gazette*, November 14, 1913; also of an article in the issue of September 22, 1916.

"A Free Route to Persia and Afghanistan"

How England Built Her Sind-Pishin Railway to Protect the Indian Frontier from Invasion

"WE HAVE ACQUIRED a direct free route via Russia to Persia and Afghanistan," said the despatch from the Wolff Bureau, the German semi-official news agency, which was featured in first page headlines in the American press on Saturday last.

Although it would be hard to believe that Germany might have any hopes at this time of conducting such a long range campaign as would be required in Persia or Afghanistan, the announcement is of more than ordinary importance because it is an implied threat at the British possessions in India.

The probable route of the line is through Lemberg or Kiev, which the Germans have announced they are holding, southward and eastward, through Odessa, Postov, Caucasia and Trans-Caucasia to northern Persia, from which there are a number of routes to Afghanistan. The Germans now have the privilege of transportation through Odessa and Trans-Caucasia, while northern Persia, under the compact negotiated by Earl Grey, has been within the Russian sphere of influence. Such a route would extend about 2,500 miles from Berlin, but it would nevertheless constitute a very grave menace to India. Through the Balkans and Turkey the Germans have at their command another direct route to Persia and Afghanistan, shorter by nearly 750 miles than the Russian line.

If the Germans were ever to attempt to conduct a campaign towards India, and India is such a prize that the idea is not impossible, her armies would meet two very formidable obstacles—distance and terrain. To overcome the former there are no railroads in northern Persia, but there is a line in southern Siberia, the Trans-Caspian, which starts at Krasnovodsk Bay on the Caspian Sea and runs east through Bokhara and Samarkand, with a branch from Merv south to the border of Afghanistan. Afghanistan itself has not a single mile of railway line and its country is so mountainous as to be almost inaccessible. In India, on the other hand, there is a line from Karachi to the southern border of Afghanistan and another to Peshawar on the eastern border. Afghanistan has served for many decades as a border state between Russia in Siberia and England in India. Will it soon have a new importance as a border state between Germany and England?

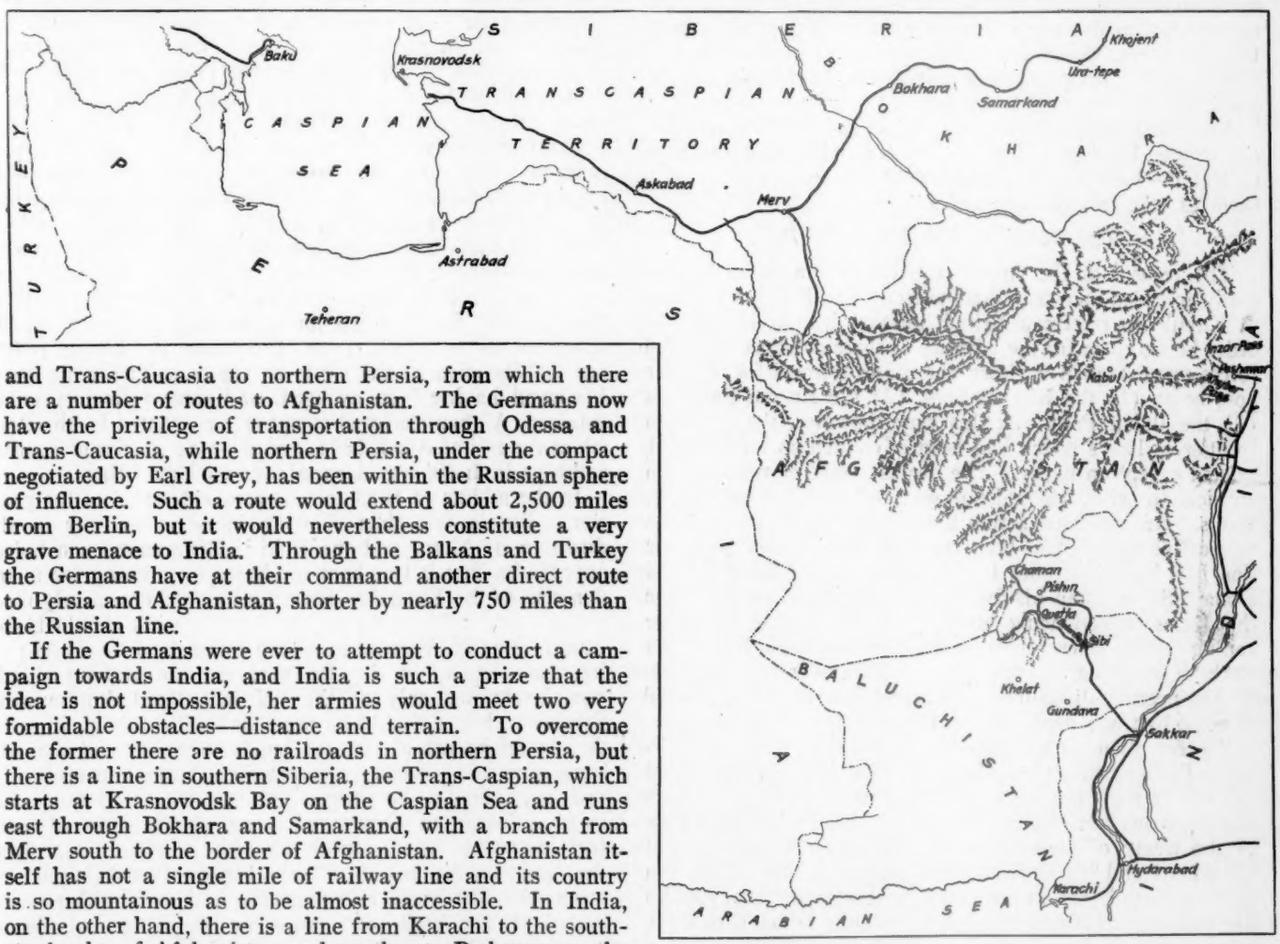
It is in the light of that question that it is of particular interest at this time to look back a few years to the struggles that have taken place over Afghanistan and to efforts that have had to be taken to protect the border of that country against invasion of India. The story is of particular interest from a railway standpoint, for there are few railways in the world that have been built under such adverse conditions or the construction of which has surmounted so many obstacles, physical or political.

The story which follows is abstracted from E. A. Pratt's "Rise of Rail Power in War and Conquest," P. S. King & Son, London, and appears in that book as an appendix entitled "Indian Frontier Railways."

India's Most Vulnerable Point

On the north-west frontier of India the plains of the Punjab are separated from the great central valley of Afghanistan, from the deserts of Baluchistan, and from the Russian Empire on the north thereof, by ranges of mountains, otherwise "a gridiron of stupendous ridges and furrows" intersected by passes which have always been regarded as the most vulnerable points of the Indian Empire. Through these passes from the earliest days of recorded history there has come a long succession of invasions instigated by that incalculable wealth of India which may well have inspired the envy of dwellers in less favored lands.[1]

These considerations would alone suffice to establish the



Afghanistan and the Railways Leading to It.

These considerations would alone suffice to establish the

[1]Altogether there have been 26 invasions of India, dating back to about 2,000 years B.C., and of this number no fewer than 21 have ended in conquest.

need for an effective control of the more important of the said passes by the power which exercises supremacy in India; but the obligation thus devolving upon the British people as the present holders of that supremacy has been increased in recent times by two further factors—(1) troubles with frontier tribes; and (2) the development of that central Asian question which, though now no longer acute, was, not so many years ago, a source of great anxiety in England and India. Frontier troubles gave rise to a number of expeditions to Afghanistan from time to time, while the gravity of the general situation was increased by the once steady advance of Russia towards India—whether for purposes of actual conquest thereof, or alternatively, for the attainment of the aim cherished by Russia during three centuries for an outlet to a southern sea, such outlet being sought via the Persian Gulf on her disappointment in regard to the Dardanelles; though British interests were concerned in either case.

This combination of circumstances, with the possibility, at one time, that Afghanistan might become the theatre of war in a conflict between two great European powers, invested with special interest and importance the provision on the north-west frontier of India of railway lines which, whether constructed to the more important passes or going actually through them, would form a ready means of concentrating Anglo-Indian troops at such places on the frontier, or beyond, as occasion might require.

From this point of view the Bolan and Khyber passes—the former leading to Quetta and Kandahar and the latter to Kabul—have more especially had importance attached to them as "the two gates of India."

The Political Troubles of 1878

The refusal of the Ameer of Afghanistan—who had already accorded an ostentatious welcome to a Russian Embassy at Kabul—to receive a British mission led, in 1878, to an order being given for the advance of three columns of British forces upon Afghan territory, the routes selected for this purpose being (1) the Khyber Pass, (2) the Kuram Pass, and (3) the Bolan Pass. At this time, however, the system of frontier railways which had been advocated so long scarcely existed except on paper. The nearest point of railway communication with Afghanistan was them at Sukkur, on the Indus. An extension across the Sind desert to the entrance to the Bolan Pass had been surveyed, and a very short section had been laid; but in their advance on Kandahar Sir Donald Stewart and his force had to march all the way from the Indus, experiencing great trials in crossing the intervening desert, where many of the men lost their lives. The work of constructing this desert railway—which presented no engineering difficulty—was now taken actively in hand, and the line was available for the troops on their return.

Success attended the expedition of 1878 so far as it led to the flight of Shere Ali, the occupation of Kandahar by Sir Donald Stewart, the control by the British of the three main highways between India and Afghanistan, and the signing of the treaty of Gandamak; but the murder of Sir Louis Cavagnari and his staff at Kabul, in September, 1879, rendered necessary the sending of a further expedition, General Sir Frederick (afterwards Lord) Roberts being directed to proceed with a British force by the Kuram route to Kabul.

Thereupon the whole question of transport facilities was revived afresh and, although the expedition itself was a conspicuous success, delays and commissariat difficulties arose which might have been avoided had better railway facilities been available. The terminus, at that time, of the Punjab State Railway was at Jhelum, 70 miles from Rawal Pindi, 180 from Peshawar and 260 from Thal, the frontier post of the Kuram Pass; and in spite of the vigorous efforts made, between 1878 and 1880, to extend the line, Jhelum remained the actual railway base throughout, no material assistance being gained from the 20 miles of extension which, owing to the great engineering difficulties presented by innumerable ravines, could alone be carried out during that period.

Rawal Pindi—one of the most important strategical points in India—was not reached by the railway until October, 1880, by which time the Afghan War of 1878-80 had been brought to a close; and the further extension of the Indian railway system to Peshawar—another position of the utmost strategic importance, situate 10 miles from the entrance to the Khyber Pass, and 190 from Kabul—was effected by May, 1883.

Railway Towards Kandahar

From a military point of view, however, still greater importance was attached, at that time, to the securing of rail communication through the Bolan Pass to Quetta and Pishin in the direction of Kandahar, this being the route by which, it was thought, the Russians would be certain to attempt their invasion of India—if they should undertake one at all.

Surveys for an extension of the Sukkur-Sibi desert line to Pishin were made while that line was under construction, and early in 1880 the government gave directions that the extension was to be proceeded with; though they decided that the route to be taken from Sibi should be through the Hurnai Pass in preference to the Bolan route, the former being regarded as preferable for the broad gage line (5 ft. 6 in.) with which the "Kandahar State Railway," as it was to be called, would be provided.

Arrangements were at once made for collecting the necessary materials and for carrying through the work with the least possible delay; but further progress was checked in July, 1880, by the disaster at Maiwand. In the following October the Gladstone Government, which had succeeded the Beaconsfield Administration and had, apparently, resolved upon a complete reversal of the Indian policy of their predecessors, followed up an earlier announcement of its intention to withdraw from Kandahar by giving orders for the cessation of the work on the Sind-Pishin Railway, Maiwand having been avenged, and some refractory tribes subdued, Afghanistan was completely evacuated by the British at the end of April, 1881, and the construction of frontier railways in India was dropped, for the time being.

In the middle of 1883 came a reconsideration of the position. Russia was then showing increased activity in the direction of Merv, and the British Government concluded, apparently, that it had been too hasty in ordering the abandonment of the Kandahar State Railway scheme nearly three years before. So it gave orders that the work should be resumed; though, in order to render this *volte face* on its part less conspicuous, it directed that the undertaking should now be known only as the "Hurnai Road Improvement Scheme"; that it should be proceeded with quietly, in order that it might not attract too much attention, and that the suggestion of a "road improvement scheme," instead of a railway, should be kept up by the engineers, not being allowed to have even a temporary line of rails for conveying stores, materials for bridges, etc., from the base to the passes. This last-mentioned stipulation meant that the stores and materials had to be either transported on the backs of camels or dragged on wheels up stream; and it was estimated that, in addition to the great loss of time, a sum of not less than 1,000,000 pounds was wasted in this way before the order prohibiting the use of temporary rails was rescinded.

Russian Advance Toward Merv

A start was made with the work in October, 1883, and the fact that the Russians were then actually approaching Merv, and that a sudden advance by them in force was regarded as probable, led to the laying of great emphasis on the need for construction being pushed on with the utmost vigor. When, in February, 1884, the Russians did occupy

Merv, the pressure brought to bear on the engineer-in-chief became still more acute. Then, in May, the British Government formally announced that, owing to the encroachments of Russia, the line would be built. The fiction of a "Hurnai Road Improvement Scheme" was now abandoned. Henceforth the line under construction was to be known as "The Sind-Pishin State Railway."

From the very outset, however, the difficulties which crowded upon Colonel (afterwards Sir James) Brown, R. E., an officer well experienced in railway and engineering work, who was entrusted with the carrying out of the scheme, were unfavorable to the prospects of speed in construction. The surveys, which had already been made, were found not only worthless but misleading. The first members of his staff were unacquainted with railway work and had to be succeeded by men brought from England. The plant and materials previously collected, but disposed of at scrap-iron prices when the line was abandoned in 1880, had now to be replaced at an almost fabulous cost, owing to the urgency of the need for them.

The Forbidding Physical Obstacles

All these were, nevertheless, minor troubles as compared with the physical conditions to be overcome.

Starting from an elevation at Sibi of 300 ft., the line was to rise 6,200 ft. in the 120 miles between Sibi and the summit level at Kach.

Then, for the greater part of the 224 miles to which the line was to extend, the country was a wilderness of rocks and stones—a lond of barrenness and desolation, where there was no timber, no fuel, scarcely a blade of grass, and, in places, for stretches of several miles, no water. It was a land, too, almost devoid of inhabitants, while those who did dwell there were described as "a savage and blood-thirsty race of robbers," continually engaged in plunder and inter-tribal warfare, and not growing sufficient food even for their own consumption. Almost everything that was wanted—including supplies for from 15,000 to 30,000 workers and materials for the line—had to be imported from a distance.

Still less inviting was this inhospitable region by reason of its range of climatic conditions. The lowlands have the reputation of being one of the hottest corners of the earth's surface. A temperature of 124 deg. has been registered in the Narie Valley. The highlands, in turn, offer the alternative of Arctic cold, the temperature there falling in winter to 18 deg. below zero. Between the lowlands and the highlands there is a temperate zone; but here the constant pestilence was dreaded no less than the extremes of heat and cold elsewhere.

As the result of these conditions, the work of construction could be carried on in certain districts for part of the year only, and the workers had to be transferred from one section of the line to another according to the season. Such a movement of front involved the transport of everything—stores, tools, offices and some thousands of men. "The management of this vast exodus," says Captain Scott-Moncrieff, R. E., in his paper on "The Frontier Railways of India," "was a work of considerable anxiety and difficulty. A sudden influx of people, such as this, into a desolate and barren land naturally caused a famine. Everything was eaten up, and for some days the question of supplies was the burning question of the hour. . . . Nine hundred camel loads of food were consumed daily on the works." The customary load for a camel was 400 lb., but some of the camels carried loads of 800 lb. up the pass.

"One of the Most Weird Tracks"

The engineering difficulties fell into four principal groups: (1) the Nari Gorge, (2) the Gundakin Defile, (3) the Chuppur Rift, and (4) the Mud Gorge.

The Nari Gorge, about 14 miles in length, beginning just beyond Sibi, has been described as "one of the most weird tracts through which a railway has ever been carried. The hills, absolutely bare, rise above the valley for many thousands of feet in fantastic pinnacles and cliffs. It is a scene of the wildest desolation." The Nari River, running through the gorge, is formed by a combination of three streams having but little water on ordinary occasions, but becoming, in time of flood, a raging torrent which fills up the whole gorge for miles, attains a depth of 10 feet, and has a velocity of five feet per second. Over this river the railway had to be carried in five different places. Not alone bridges, but heavy embankments, cuttings and tunnels were needed. At one point there was an especially dangerous tunnel in which so many accidents occurred, owing to roof or sides falling in, that at last no workmen would enter it except at a wage five-fold that of the high rate already being paid. The whole work was liable to be stopped for months together, owing to the washing away of half-completed embankments, or bridges; though until this portion of the line had been completed no materials could be sent to the sections beyond.

In the Gundakin Defile, eight miles long, two tunnels had to be made through some most treacherous material, and four bridges had to be provided.

The Chuppur Rift is a chasm three miles long in the spurs of a rocky mountain forming an apparently insuperable barrier. The running of the railway on a ledge along the side of the mountain being impracticable, owing to the nature of the rock, the engineers cut a line of continuous tunnels partly on one side of the rift and partly on the other, connecting the two series, by an iron girder bridge; but, instead of constructing the tunnels in the usual way, from each end—a procedure which would have taken much time—they adopted the expedient of driving openings (adits) into the side of the cliff at various points, and then cutting the tunnel right and left of each of these openings until the various sections met. The only way in which the openings could be made was by lowering men down by ropes several hundred feet from the top of the cliff until they reached the point where the work for an opening was to be started. They then drove crowbars into the perpendicular sides of the cliff in order to gain the necessary support for a platform from which the blasting operations could be carried on. Six of these openings were made on one side of the cliff and six on the other. As a separate gang of men could operate at each it was possible to complete the whole work in the course of a few months. Altogether there is a collective length of 6,400 ft. of tunnels in the rift, in addition to a viaduct 75 ft. high, with seven spans of 40 ft. each, and a bridge having an elevation over the river of 250 ft., and consisting of a central span of 150 ft. and eight spans of 40 ft.

On the summit level, 25 miles in length, came the five-mile long Mud Gorge—a narrow valley, between precipitous mountains, filled with a soil little better than dried mud, and of such a character that several bad slips of road-bed, carrying away the whole of the line, occurred.

Fever, Scurvy, Cholera, Desertions

In August and September, 1884, the troops and native laborers employed on the work on the lower part of the line were visited by an outbreak of fever and scurvy of a virulence almost unprecedented in Indian experience. Large numbers of the men died. In one gang of 200 the average numbers of deaths was ten a day. Of those who survived the majority were so prostrated as to be scarcely capable of doing anything. Sixty per cent of the sappers were in hospital.

Fresh troops, to the extent of three battalions of Pioneers, were brought on to work; but they had scarcely arrived before—in November—there was a severe outbreak of chol-

era. The Afghans thereupon "bolted to a man"; and they were followed by many skilled artisans who had been collected from various parts of India. Additional labor had to be obtained from the Eastern Punjab, but much time was lost.

Whilst the engineers were struggling to overcome these manifold difficulties, the political situation was steadily becoming still more acute. The climax seemed to be reached by the Penj-deh incident of March 30, 1885, when a Russian force under General Komaroff seized this important strategical position, situate near the junction of the Khushk and Murghab rivers. On April 27, 1885, Mr. Gladstone proposed in the House of Commons a vote of 11,000,000 pounds ($55,000,000) for the purposes of what then seemed to be an inevitable war with Russia. The money was voted the same night.

So the urgency for completing the line which would now, probably, have been available for use had it not been stopped in 1880, was greater than ever. Orders were sent to India that the work must be continued along all parts of the line regardless of seasons. Within a week or two, however, of the war vote at Westminster, cholera broke out afresh among the construction party in India. By the end of May it was spreading among them "like a raging fire"; while to the cholera itself there was added a heat so intense that even the most willing of workers found it almost unendurable.

Under this combination of cholera and excessive heat, work on the lower sections of the line was stopped altogether for a time—government orders and Russians notwithstanding. All possible measures were taken to mitigate the severity of the epidemic; but the death-rate increased with frightful rapidity. Some of the best workers, European and Asiatic—men who could least be spared, on account of the responsible positions they held—were carried off. During the month of June no fewer than 2,000 died out of 10,000. Of the remainder large numbers sought safety in flight. Many of the minor government officials, such as telegraph and post office clerks, went off in a body.

Whilst sickness and disease had thus been afflicting the camps, fresh troubles had arisen in another direction. Early in 1885 the district was visited by a succession of floods exceeding in severity anything known there for sixty years. In the course of three months the rainfall amounted to 19.27 inches,—a total six times in excess of the average. Several bridges and many miles of temporary roads were washed away; numerous accidents were caused; camping grounds were destroyed; communications were interrupted; food supplies became scarcely obtainable, and great delay resulted in the prosecution of a work for which urgency was being so persistently demanded. The floods did not finally subside until the end of May.

Nature having done so much to impede the progress of the undertaking, it only remained for politicians and officials to do what they could to follow her example.

Mention has already been made of the initial prohibition of temporary lines of rails for the conveyance of stores and materials, and the loss of time and waste of money involved in the use of camels instead; but to this one fact may be added another, namely, that after the engineer-in-chief had made his arrangement to obtain sleepers from the juniper forests on the north of the line—this being the only timber available in the whole district—the government vetoed the arrangement on the ground that it might, possibly, lead to quarrels among the Afghan tribes. The timber had to be procured from India, instead. Hence more delay.

Such, however, was the energy which had been shown, in spite of all these difficulties and drawbacks, that the work was completed within the two years and half fixed by the engineer-in-chief at the start as the period in which—"with money freely granted"—it could be done. On March 27, 1887, an engine ran over the line all the way from Sibi to Quetta, and the Hurnai Railway was formally declared open for traffic.

In the meantime the apparent certainty of war with Russia, following, especially, on her seizure of Penj-deh, had led, in April, 1885, to an order being given for the construction of a light railway from Sibi through the Bolan Pass to Quetta, as an alternative, more direct and more quickly constructed route, of which use could be made for a movement of troops to the frontier on the anticipated partial mobilization of the Indian Army.

A Notable Engineering Achievement

The laying of this light railway constituted another notable engineering achievement.

Running through the heart of what has been described as "some of the boldest mountain scenery in India," the Bolan Pass has a length of about 60 miles and a breadth ranging from one mile to a space, in places, of only about 20 yards between the rugged mountain walls which here convert the pass into a mere defile. The pass is, in fact, practically the bed of the Bolan River, and is dry for the greater part of the year, but liable to floods. The temporary narrow gage line was to be laid along the river bed without interfering with the military road constructed in 1882-84 as far as Quetta.

For the first 40 miles there was a fairly good gradient; but beyond that came a very heavy rise to the top of the pass; and here, at least, anything more than a metre gage line would have been impracticable. The possibility of constructing a line of railway through the pass at all had long been the despair of engineers, and this was the reason why the Hurnai route had been decided on in preference to the Bolan for the broad gage line to Quetta. Unfortunately, too, the climatic were even greater than the engineering difficulties. The heat in the lower parts of the pass was "beyond all description," and cholera or other diseases carried off thousands of the workers.

With these two lines at their disposal, the government was, in the spring of 1887, quite prepared for a concentration of British and Indian forces in Afghanistan, had the political conditions rendered such a course necessary; but the situation had by then greatly improved, thanks to the negotiations which had been proceeding with Russia for the demarcation of frontiers. In April, 1877, the British and Russian commissioners met at Petrograd, and, as the result of still further negotiations, the questions at issue were settled without the appeal to arms which had at one time appeared inevitable.

In 1892 some 50 miles of the Bolan light railway were abandoned in favor of another route which, avoiding the first part of the pass, allowed of a broad-gage line being laid from Sibi through Quetta to Bostan Junction, where it connects with what is now known as the Hurnai-Pishin Loop. A branch 90 miles in length, from Quetta to Mushki, on the Seistan trade route, was opened in 1905.

A Strategic Line

Today the Sind-Pishin railway, with its two sections, via the Bolan and the Hurnai respectively, has its terminus at Chaman, on the actual frontier of Afghanistan, and within 70 miles of Kandahar. A broad gage line throughout, it forms part of the railway system of India, linking up at Ruk junction with the line running thence along the north bank of the Indus to Karachi, and, by means of a bridge across the Indus, with a line on the south of the river which, in one direction provides an alternative route to Karachi, and in the other connects with Calcutta and other leading cities. The Sind-Pishin line affords, in fact, a most valuable means for concentrating on the Afghan frontier, within a short distance of Kandahar, and in the shortest possible time a considerable body of troops collected from all parts of India, together with reinforcements from Europe, landed at Karachi.

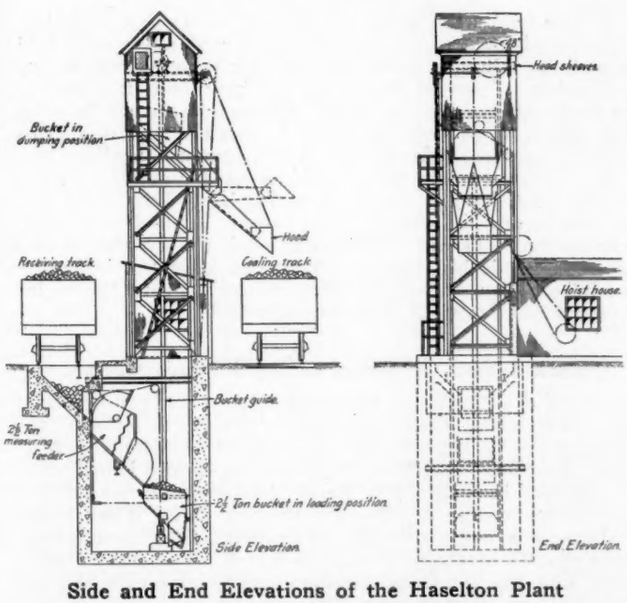
As a strategical line, therefore, the railway is of exceptional importance to India and to British interests in general; though there can be no suggestion that it would be used otherwise than for purely defensive purposes.

Then, in what, since 1901, has constituted the North-West Frontier Province of India, there has been a considerable extension of frontier railways in recent years,—all serving important strategical purposes. From Peshawar—1,520 miles from Calcutta—there is a broad gage extension, twelve miles in length, to Fort Jamrud, at the mouth of the Khyber Pass; from Naushahra, a cantonment 27 miles due east of Peshawar, there is a narrow gage line to Dargai, at the foot of the Malakand Pass; while among other lines is one to Thal, a military outpost on the extreme limit of British territory which serves also as a depot for the trade with northern Afghanistan passing through the Kurram valley; and one to Banu, a garrison town, 79 miles south of Kohat, built on a site chosen for political reasons by Sir Herbert Edwards in 1848.

A number of other railways on the north west frontiers of India have been proposed. Whatever may or may not be ultimately done in regard to these further schemes, it is obvious that those already constructed have made an enormous difference in our strategical position in regard to Afghanistan and the lands beyond as compared with the military transport conditions of 1878.

A Plant to Transfer Coal and Ore Mechanically

THE PITTSBURGH & LAKE ERIE recently placed in operation at its Haselton yard, a mechanical coal handling plant for transferring the lading of bad order cars to other cars. Haselton yard is located at Youngstown, Ohio, and is the point where the road exchanges a large amount of traffic with the New York Central and the Erie and also handles the enormous traffic of the Youngstown district. As is usual at such places a great many loaded cars are found to be defective, making it necessary to transfer the loading. The kinds of material in these cars, of course, vary widely, but they can be classed under three general heads: (1) materials handled in hopper and drop bottom cars, such as coal, coke, crushed limestone, sand, gravel, iron ore and similar material; (2) materials loaded in box cars; and (3) heavy material loaded in open cars requiring the use of a crane for transfer.



Side and End Elevations of the Haselton Plant

These three kinds of freight require different facilities for handling. The mechanical transfer plant referred to was designed to handle the materials in the first classification, and it includes platforms to facilitate transferring lading from one box car to another and a large electrically-operated gantry crane spanning two tracks for handling the heavy materials.

Previous to the construction of these facilities the transfers described in the first and second divisions were handled entirely by hand, making it necessary to keep a large force of laborers at this kind of work, while the heavy materials were handled by locomotive cranes, wrecking cranes, or in any other way that might be available. It is found by the use of the improved facilities that the delay to cars on account of defective equipment has been very much reduced, and that the cost of transfer has also been lessened.

The nature of this mechanical transfer plant is indicated in the photograph and drawing. The plant was built by the Roberts & Schaefer Company, Chicago, and consists essentially of one of the typical coaling stations built by this firm with the storage facilities omitted. The material to be transferred is received from the defective cars in a 9-ft. track hopper from which it is transferred to a 2½-ton elevating bucket by means of a Schroeder measuring coal feeder.

View of the Transfer Station from the Loading Side

The elevating bucket operates in a structural steel tower from the top of which the coal is dumped into a spout which affords a convenient means of discharge into the substitute car standing on a track parallel to and 26 ft. from the hopper track. The elevating machinery has a capacity of 75 tons per hour and, as in the case of the equipment for the standard coaling station of the same type, the operation is entirely automatic. An electrically-operated hoist is located in the small steel-frame shed adjoining the tower, which also contains the necessary regulating apparatus, starting switch, etc. We are indebted for the above information to A. R. Raymer, assistant chief engineer, of the Pittsburgh & Lake Erie, Pittsburgh, Pa., who represented the railway in working out the details of the improvement.

General News Department

Judge Robert S. Lovett, according to the official circular announcing his appointment as a member of the staff of Director General McAdoo, will have the title of Director of the Division of Capital Expenditures, instead of the "Division of Betterment and Additions," as it was originally announced.

A charge for placing and spotting cars on industrial tracks is not contemplated. This announcement has been made by the Railroad Administration after the receipt of nearly 2,000 telegrams and letters of protest. A memorandum of a plan for such charges was prepared in the traffic division, as a suggestion only; and the report that it was being considered was widely circulated among shippers and state railway commissioners.

Senator Kellogg, of Minnesota, has introduced a bill in Congress to include members of the Russian Railway Service Corps, consisting of about 350 railroad officers and men sent from this country to Russia last year to assist in organizing the Russian railway system, within the terms of the war insurance provided for the United States army. The Russian Railway Service Corps is not a part of the regular army but was specially organized and was financed by the Russian government.

Fuel for the New York Central is the subject of a special order issued by the Fuel Administration on March 6, addressed to coal operators under contract to supply fuel coal to that road, giving priority to such contracts and providing for making regular daily and weekly shipments. Mines under contract to furnish coal to the New York Central will be required to fill these contracts before taking on other business; and the railroad company is charged with the duty of providing cars promptly.

Forest fires burned over 962,000 acres of National Forest lands in 1917 and caused a loss of $1,358,600 to the government in timber, forage and young growth, according to figures compiled by the Forest Service of the Department of Agriculture. In addition to the actual loss in timber and forage, these fires entailed extra expenditures by the government of $1,121,451 for watchmen, supplies, etc. Of the 7,814 fires fought on the National Forests, 2,132 were set by lightning, and 952 were incendiary. Careless campers were responsible for 1,288, and railroads for 1,003.

On the Boston & Albany, the officers and employees have formed a permanent organization to gather and record information concerning employees who are now in the military or naval service, and to take charge of the sending of gifts to the men. "Our Fellows At the Front" is the title of a pamphlet which has been issued by a committee telling what has been done up to this time, and giving names of the soldiers and sailors (so far as compiled) together with much other information. The chairman of the committee is W. E. Adams, press representative of the road, Boston.

The mining of clean coal is to be enforced by the Fuel Administration, according to an announcement which has just been made. An inspection system will be organized. During the past winter much of the output of bituminous coal has contained a large percentage of slate and other impurities, the effect of which has been not only to reduce the selling value of the coal, but to put an additional unnecessary burden upon transportation facilities. Under the new plan adopted, coal condemned by the Fuel Administration, either lacking preparation or because it contains a high percentage of impurities, will be sold at 50 cents a ton less than the fixed government price for the mine. The inspection system will be operated through the district representatives of the Fuel Administration, who are authorized to appoint a sufficient number of inspectors to carry out the terms of the order, which went into effect last Monday. Inspectors are authorized to condemn at the mines any coal which, in their judgment, is not properly prepared.

Western Railway Club Meeting

The next meeting of the Western Railway Club will be held at the Hotel Sherman, Chicago, on Monday, March 18. Professor G. A. Young of Purdue University will present a paper on railway mechanical problems, and H. R. Warnock, general superintendent of motive power of the Chicago, Milwaukee & St. Paul, will give an informal address.

Mail-Pay Decision Confirmed

The United States Court of Claims on March 11 reaffirmed its previous decision in the railway mail pay "divisor" case, dismissing the petitions of a number of railroads for claims against the government for large amounts of back pay from the post office department. The former decision was sustained by the Supreme Court but by an evenly divided ruling, so that the case was reopened in the lower court.

Thirty-First Engineers an Operating Regiment

Col. Frederick Mears, formerly a member of the Alaskan Engineering Commission, announces that the Thirty-first Engineers, which is being organized under his direction, is to be a railroad operating organization. With few exceptions every man of the new organization will be a man experienced in railway operation. Applications will be received only from men who have good records as locomotive engineers, firemen, brakemen, railway clerks, yard foremen, trainmasters, switchmen, conductors and others whose training fits them for the duties of operating trains. Col. Mears' regiment will mobilize at Fort Leavenworth, Kan., and recruiting officers are being established at various points throughout the United States.

Disloyalty Charge a Gross Calumny

"I have read with dismay that the charge has been made that the railroad heads of this country do not wish government control of the railroads in this time of war to be successful, and are trying to prevent its success. I have faith that such a traitorous charge has not found lodgment in the public mind. The charge is as damnable as it is deceitful and is a gross calumny upon the railroad men of this country. I adjure you, even as I lay the duty upon myself, to stand firm against touch or taint of disloyalty. Any country that is not loyal to its government in times of stress is not a nation. Let us help in every way we can. The war must be won. It is the privilege of each one of us to do his share to achieve that great and imperative result."—William Sproule, president of the Southern Pacific, before the San Francisco Transportation Club.

Rock Island Generous to Its Soldiers Abroad

During the month of February officers and employees of the Rock Island Lines contributed a total of $569 to the "Smoke Pot" maintained for the benefit of Company B of the Thirteenth Engineers (Rys.), the Rock Island contingent now in France. The Missouri division was the heaviest contributor during the month, sending $175. The Illinois division was next with $75, and other heavy contributors were the Minnesota division with $63; the dining car department with $63; the Cedar Rapids (Iowa) shops with $55, and the St. Louis division with $49.

In February a shipment of tobacco costing $286 was made to Company B, and in March athletic equipment costing $242 was shipped, consisting of complete outdoor baseball outfits, sufficient to equip two full teams, 12 tennis rackets, 2 dozen tennis balls, and tennis nets, indoor baseballs and bats, 8 sets of boxing gloves, quoits, footballs and 4-lb. medicine balls. In addition $150 was cabled to the company as a contribution to its mess fund.

Fuel Order Modified

United States Fuel Administrator Garfield has issued an order revoking Section 1, of the regulation promulgated January 17, in all states east of the Mississippi, except Pennsylvania, Maryland, West Virginia, Ohio and eastern Kentucky. The order, which went into effect March 5, suspends certain provisions relating to priority in furnishing coal to railroads, domestic consumers, Army and Navy cantonments, public utilities, hospitals and other preferred consumers.

The five states in which the regulation continues in full force embrace the anthracite and bituminous producing fields which supply the eastern section of the country, and coal operators therein will continue to give preference to shipments for consumers in the order named in the regulation. It is also provided that in those states the provisions of Section 1 shall be extended to include contracts for coal made or accepted after January 17, as well as contracts and orders on hand, on that date.

Improved transportation conditions and other factors have contributed to a material improvement in the coal situation in the territory where the coal priority list has been suspended. In the states where the regulation continues in force the car shortage has not been entirely overcome.

Determination of Priorities

In connection with the appointment of B. M. Baruch as chairman of the War Industries Board, President Wilson has written a letter outlining the functions of the board and of the chairman, which are somewhat enlarged as compared with those of the former organization. One of the functions of the board is:

"The determination, wherever necessary, of priorities of production and of delivery and of the proportions of any given article to be made immediately accessible to the several purchasing agencies when the supply of that article is insufficient, either temporarily or permanently."

Continuing, the letter says: "In the determination of priorities of production, when it is not possible to have the full supply of any article that is needed produced at once, the chairman should be assisted, and so far as practicable guided, by the present priorities organization or its equivalent.

"In the determination of priorities of delivery, when they must be determined, he should be assisted when necessary, in addition to the present advisory priorities organization, by the advice and co-operation of a committee constituted for the purpose and consisting of official representatives of the food administration, the fuel administration, the railway administration, the shipping board and the war trade board, in order that when a priority of delivery has been determined there may be common, consistent and concerted action to carry it into effect * * *."

West Observes Embargo to Permit Reduction of Accumulation in the East

In order to enable eastern lines to clear up accumulations, R. H. Aishton, regional director of western railroads, requested the lines under his jurisdiction to discontinue from March 10, the loading of carload freight for places east of the Illinois-Indiana state line. The only exceptions to this embargo are traffic authorized by general operating committee, freight traffic committee or director-general permits; live stock and perishables, coal, coke and charcoal; acids, alcohol, ammonia, light oil and petroleum; empty tank cars; domestic food for human consumption and domestic feed for animals and poultry, not including hay or straw.

The regional director of western roads is still giving special attention to the movement of grain to primary markets and particularly to the transportation of soft corn, which demands prompt handling to prevent deterioration beyond the point of recovery. That the efforts of the Railroad Administration in this direction have borne fruit is evidenced by recent statistics of receipts at primary markets. In February the total grain received at primary markets was 71,754,000 bu. as compared with 48,397,000 bu. in the same month of 1917. In the first nine days of March the receipts at primary markets totaled 28,158,000 bu., as compared with 20,406,000 bu. in the same period the year before. The movement of corn and oats to markets is appreciably heavier than it was a year ago, while the movement of wheat is somewhat smaller.

The plan of moving grain, flour and meat for export in solid trainloads from primary markets to seaboard is working out to the satisfaction of both the Railroad Administration and the Food Administration. On March 11, eight trainloads of corn were en route to Gulf ports and one of flour to an eastern seaport, while two trainloads of oats, one of barley and three of corn were scheduled to make their departures on that day from primary markets to eastern and southern ports.

American Railway Engineering Association Program

The following program has been issued for the nineteenth annual convention of the American Railway Engineering Association, which will be held in Chicago on Tuesday to Thursday, inclusive, of next week. Morning sessions will continue from 9:30 to 12:30, and afternoon sessions from 2 until 5. The president's address and the secretary's report will be presented on Tuesday morning, following which the committee reports are scheduled in the order shown below, but the program is subject to such change as may appear desirable during the convention. It is expected that most of Wednesday will be devoted to the consideration of the labor problem, which will necessitate some transference of the reports assigned for presentation on that day.

March 19—Signals and Interlocking.
Conservation of Natural Resources.
Buildings.
Track.
Water Service.
Records and Accounts.

March 20—Electricity.
Yards and Terminals.
Economics of Railway Labor. Illustrated use of labor-saving Devices.
Ballast. Illustrated use of mechanical tampers.
Economics of Railway Operation.
Uniform General Contract Forms.
Roadway.

March 21—Iron and Steel Structures.
Wooden Bridges and Trestles.
Masonry.
Ties.
Stresses in Railroad Track.
Rail.
Signs, Fences and Crossings.
Rules and Organization.
Wood Preservation.

The annual dinner will be held on Wednesday evening and will be in the nature of a "war dinner." Among the speakers already secured are Sir Edmund Walker, president of the Canadian Bank of Commerce, Montreal, and Rev. Stephen K. Mahon, of Toledo, Ohio.

The Railway Signal Association will hold its stated meeting at the Auditorium Hotel on Monday, March 18, while the National Railway Appliances Association will present its exhibit at the Coliseum throughout Monday, Tuesday, Wednesday and Thursday.

Meeting of Railway Supply Interests

The Railway Business Association will hold a meeting at the La Salle Hotel in Chicago on April 8. Because of the special problems before the supply interests at this time the meeting will be of more than ordinary importance and a large attendance is expected.

Western Society of Engineers

The Western Society of Engineers at its meeting in Chicago on Tuesday evening, March 19, will present a program on the material situation as it affects engineers. There will be a paper on conditions in structural steel plants by Frank J. Llewellyn, division contract manager of the American Bridge Company, Chicago; one on conditions in the lumber industry by Hermann von Schrenk, consulting timber engineer, St. Louis; and one on conditions in the cement industry by B. F. Affleck, president of the Portland Cement Association, Chicago. A special invitation has been tendered to members of the American Railway Engineering Association, in convention at Chicago that week, to attend this meeting.

Traffic News

President Wilson and Director General McAdoo have been urged by a large delegation of senators and respresentatives to use a part of the $500,000,000 fund appropriated in the railroad control bill, to establish barge lines on rivers and canals.

The following circular has been sent by the Car Service section to all railroads: "We must at this time impress upon all the necessity of giving special attention to the handling of seeds and agricultural implements for the next 60 days that they may be ready for spring planting."

Major-General Harry Clay Hale, of the United States Army, addressed the Transportation Club of Louisville, March 12, on the subject "What Transportation Has to Do with the War." Major-General Hale addressed the club last year on the details of transporting armies and supplies, since which time he has been in France to survey the situation there.

The Railroad Commission of Louisiana will hold a session at Baton Rouge, on March 20, to consider the adoption of Western Classification No. 55 and supplement No. 1 thereof, for use on business moving between points west of the Mississippi river, and between points east and points west of the river.

The tourist season at the Yellowstone National Park this year will be slightly curtailed. The opening date will be June 25 and the closing date, the same as heretofore, September 15. The trip through the park is now made by motor car, either private automobiles or those of the Park Transportation Company, which has supplanted the horses and stage coaches of former years.

The production of coal in the Province of Alberta in 1916 was, 4,563,020 tons, more than twice the quantity mined in 1909, and enough to put Alberta next to Nova Scotia in the production of coal, Nova Scotia being the leader among Canadian provinces and British Columbia (formerly second) third. The Canadian Northern reports that the mines on that company's lines doubled their output in two years; and for the year ending June 30, 1917, the total production of the mines on the C. N. was about 2,000,000 tons.

Director General McAdoo has announced that C. H. Markham, Regional Director at Atlanta, had arranged to concentrate at South Atlantic ports approximately 100,000 additional bales of cotton, making a total of 225,000 bales now en route or at port. Special steamer service is being arranged to take care of this accumulation. Steamers have been sent to Galveston, New Orleans, Brunswick, Savannah, and Wilmington to take cotton directly to New England. It is planned to place additional ships in service at an early date. The delayed cotton in cars at St. Louis and Chicago is being moved to New England at the rate of 50 cars a day. So far about 500 cars have been moved and this rate will be maintained until the delayed cotton is disposed of.

An emigrant train of 27 cars, double-decked, which passed through New Orleans on March 8, was filled with settlers from Dryden, Tex., going to live in Isabel, La. These new residents of Louisiana are sheep and goats, which have been bought by J. W. Bassett for the purpose of utilizing large tracts of land from which timber has been cut off, and which, since the lumbermen left them, have been wholly unused. Many thousand acres of land of this character are available in Louisiana. Additional shipments of cattle, hogs and more sheep are to be made by Mr. Bassett in the immediate future. The animals are from a district free of the Texas fever tick, and their new home will be in territory likewise free of that pest, which, it is believed, soon will be eradicated from the whole of the south.

Passport restrictions, limited through-train facilities, relatives in the army, fluctuating business conditions, income tax returns, and the unfavorable government attitude toward pleasure travel, make a formidable list of influences which have proved adverse to tourist traffic. The tourist communities of the far west and south have not enjoyed the super-capacity patronage of a year ago, but they report a volume of business which compares favorably with the average year. The development of our new foreign trade to South America and the far east continues to fill the steamers to those parts of the world with increasing numbers of business travelers. Accommodations must be reserved well in advance and the utmost care must be exercised in complying with passport regulations. Lake, river and coastwise steamship lines, which provide the favorite summer recreation for large numbers of our people, are planning to offer the usual routes and services this season.—*American Express Co.'s Travel Bulletin.*

Oklahoma Two-Cent Fare Law Enjoined

The two-cent passenger rate provision of the Oklahoma State Constitution was permanently enjoined on March 12, in an opinion handed down by Judge Youmans of the United States District Court at Oklahoma City. An order issued by the Oklahoma State Corporation Commission, in which the commission took jurisdiction over freight and passenger rates within the State, also was enjoined permanently. The case has been pending since 1909. The Atchison, Topeka & Santa Fe and several other railroads were plaintiffs in the suit. The opinion upholds the contention of the railroads that the constitutional provision for a two-cent fare is confiscatory.

Improved Freight-Car Efficiency

The Pennsylvania Railroad reports that its campaign to make freight cars do more work saved 73,562 cars on the lines east of Pittsburgh and Erie in a single month, December. The average load in December was 37.23 tons as compared with 31.70 tons in the corresponding month of the previous year, or an increase of 5½ tons per car. Since the early part of 1916, when the department of the Superintendent of Stations and Transfers was established the improvement has been about 30 per cent. In 1915 the average load per car was less than 29 tons; now it is 37 tons. Basing the calculation on the 164,000 freight cars on the Pennsylvania lines east of Pittsburgh, this increase has been equivalent to the addition of 49,000 cars.

On the Pacific system of the Southern Pacific during January, about 11,500 cars were saved by better loading. The freight movement of the month, 1,500,000 tons, was handled in 59,257 cars; and if each car had been loaded with the same average tonnage as in January, 1917, the same quantity would have taken 70,809 cars. Nearly one-fifth of the saving was due to improvement in loading less-than-carload merchandise. The figures do not include oil in tank cars which are always loaded to capacity.

Coal and Food Situation at Atlantic Ports

Director General McAdoo gave out on March 12 the following telegram from A. H. Smith, Regional Director at New York, showing that the railroads had fully met the conditions for transportation of food supplies and coal that is needed: "The bunker coal situation at New York harbor today is in better shape than it usually has been at this season in previous years. The reserve for bunkering transports has been built up to a point that orders have been given to hold off on shipments for two weeks.

"The following cars of export food on hand at ports named today: Boston—Canned goods 25, flour 326, provisions 137, total 588. New York—Canned goods 557, flour 620, provisions 1,150, total 2,327. Philadelphia—Canned goods 41, flour 223, provisions 188, total 452. Baltimore—Canned goods 409, flour 377, provisions 471, total 1,257. Newport News—Flour 154. Norfolk—Canned goods 86, flour 201, total 287. Grand total 4,965.

"In the total at New York are 479 cars of frozen meat. Have limited loading from Chicago to 50 cars a day.

"Total export freight on hand at all North Atlantic ports 8,016 cars on wheels, 6,760 cars unloaded on piers, and 15,713 cars unloaded on ground; total 30,489."

The Director General also gave out the following statement:

"It is not the intention of the Railroad Administration to interfere with normal commercial shipments. It has been necessary to give preferential service to supplies of food, fuel and munitions. It is expected that within a short time the railroads will be in a position to handle commercial business in the usual

way. We have not at any time issued orders interfering with commercial business except when it was necessary to do so on account of special service being required for the commodities above mentioned. Embargoes have been placed on the various railroads due to conditions caused by the extreme weather and the accumulation at certain Atlantic ports."

Economy in Interurban Motor-Truck Service

The New Jersey State Council of Defense has sent to the mayors of New Jersey cities a request that they establish "Return Load Bureaus," so that motor trucks carrying loads from one city to another may be aided in finding return loads.

Under the plan proposed the driver of a motor truck, after delivering his load, may telephone to the "Return Load Bureau" and obtain information as to where he may find a return load.

It is proposed to establish bureaus in Asbury Park, Atlantic City, Bayonne, Belleville, Bloomfield, Bridgeton, Camden, East Orange, Elizabeth, Englewood, Garfield, Gloucester, Hackensack, Harrison, Hoboken, Irvington, Jersey City, Kearny, Long Branch, Millville, Montclair, Morristown, Newark, New Brunswick, Orange, Passaic, Paterson, Perth Amboy, Phillipsburg, Plainfield, Trenton, Union Hill, West Hoboken, West New York and West Orange.

Elliott H. Goodwin, secretary of the Chamber of Commerce of the United States, Washington, has issued a circular urging local commercial organizations everywhere to establish "Return Load" bureaus. He says:

"Owners of trucks do not wish half the earning power of their vehicles to be lost. Merchants with goods piled up and awaiting shipment do not like to see empty trucks pass their doors. Such a clearing-house will not ordinarily entail any special expense. It will promote co-operation in the community. The bureau should ascertain the established lines of trucks that run regularly on fixed routes and the part of their capacity that is not being utilized. It should then obtain information from all owners of trucks used for private hauling, getting statements about the capacity of each truck, how far its capacity is used, between what points the capacity is unused, and if the unused capacity can be made available for other persons at a reasonable price. The bureau should be listed in the telephone directory. In England return-load bureaus have proved of great assistance."

Energetic Work at Hartford

[From the *Motor Truck*.]

Municipal initiative has been productive of a considerable reduction of the congestion in the freight yards of the New Haven railroad at Hartford, Conn. When the factories of Hartford were closed by order of Fuel Administrator Garfield to conserve coal and minimize railroad traffic, Mayor F. A. Hagarty believed that the thousands of workers temporarily unemployed might be induced to unload the thousands of freight cars that had been accumulating; and he called a meeting of merchants and manufacturers and a plan was determined. This was to utilize power trucks and to engage all men willing to handle freight. All freight cars were to be unloaded in a specified order; means were adopted to notify consignees to be ready to receive the freight. The railroad company was anxious to co-operate and the street railway changed the operating plan of several trolley lines that the trucks might not be obstructed in the work.

Despite the short notice, 60 trucks and more than 500 men, including 14 city firemen, worked the first day and unloaded and warehoused 5,900 tons of freight from 160 cars. The second day nearly 1,000 men and more than 100 trucks emptied considerably more than 250 cars, making a total reduction of something more than 400 cars. There were some protests from consignees who were using cars for storage, but without exception the objectors yielded when informed that their attitude would be given deserved publicity. When work was begun upward of 800 cars, laden with 30,000 tons of freight, were in the railroad yards.

There was not as spontaneous a response from the workers of the city as might have been expected, for seemingly many preferred to remain idle; though the severity of the weather may have been a deterrent to some. There is reason to believe that had the employers been able to make a direct appeal and have definite understanding relative to pay, the men would have been available in much larger numbers.

Commission and Court News

State Commissions

In a decision handed down on March 8, the State Public Utilities Commission of Illinois denied the application of William E. Golden, asking that soldiers and sailors in Illinois be permitted to ride on passenger trains for one cent a mile.

Court News

Interstate Transportation of Intoxicating Liquors Through Prohibition States

The Alabama Supreme Court holds that the state prohibition statutes, as extended by the Webb-Kenyon Act, are inapplicable to the transportation of intoxicating liquors through Alabama in transit from Georgia to Florida. If so construed the prohibition statutes would be unconstitutional.—Moraque v. State (Ala.), 77 So., 322. Decided June 7, 1917. Rehearing denied December 20, 1917.

Fires from Sparks—Burden of Proof

The Texas Court of Civil Appeals holds that to rebut the prima facie case made out by showing that fire which damaged the plaintiff's property emanated from a railroad company's locomotive, it is placing too great a burden on the company to make it establish by a preponderance of evidence that the employees in charge of the locomotive exercised ordinary care to prevent the escape of sparks therefrom, and error in the trial court's charge imposing such burden of proof on the railroad is not harmless.—St. Louis S. W. of Texas v. Johnson (Tex.), 199 S. W., 1175. Decided November 22, 1917.

Extension of Spur Tracks

Affirming an order of the State Corporation Commission, the Virginia Supreme Court of Appeals holds that the fact that a side track will be used for interstate commerce, as well as intrastate, does not deprive the commission of jurisdiction to compel the construction or extension thereof. It holds that where, after the lessee of a railroad took over the road part of a side track, some 150 feet of which, built on a wooden trestle, was burned, and the entire track was necessary, the lessee must rebuild, and it is immaterial that a certain concern will be benefited, as all are a part of the public, and are entitled to equal facilities. A railroad, it is held, cannot refuse to extend a spur track because the person desiring the spur will ship products from another State, his competitors shipping from intrastate points, resulting in a decrease in revenue on account of more inequitable interstate rates.—Washington & Old Dominion v. P. S. Royster Guano Co. (Va.), 94 S. E., 763. Decided January 24, 1918.

Mail Claim of New Haven Road Denied by Court

A claim of the New York, New Haven & Hartford for additional compensation for carrying parcel-post packages after they were added to the mails by the parcel-post act of 1912 has been denied by the Court of Claims. Such claims made by this and other New England roads aggregate over $10,000,000. The road alleged that the mails were carried at a loss, the compensation for four years being based upon a quadrennial weighing of the mails before the advent of parcel post, and that the rate was confiscatory and in violation of the Constitution.

The court held that mail contracts are subject to increase of business without additional compensation during the four-year contract period. Not being a land-grant road, the New Haven could not have been forced to carry the mails prior to the act of July 28, 1916. In continuing to carry the increased mails and accepting the contract price, including certain added compensation provided by the act of March 4, 1913, it

made the transportation a matter of voluntary contract, under which an actual loss is not a taking of property. It is pointed out that the plaintiff was not compelled to receive the mails as a common carrier.

Improper Use of Appliance

A railroad put a U-bolt on its grain cars for the purpose of assisting elevators by giving them something to hook onto in setting cars, it being intended that only one car should be pulled at a time. The Kansas City Court of Appeals holds that the railroad was not liable for injuries to a servant of an elevator caused by a bolt giving way when three cars were being pulled at once, where there was no evidence that it would not hold if one car was being hauled, or that it was a custom to move more than one car at a time.—Caenfielt v. Bush (Mo.), 199 S. W., 1041. Decided December 31, 1917. Rehearing denied January 28, 1918.

Defective Door Fixtures—Variance Between Pleadings and Proof

In an action by a railroad employee against the road, which impleaded the Pullman Company, for injuries due to a defective guard rail used to hold open the door of a vestibule in a Pullman car, the defects alleged were that the rail was bent, old and worn, and that the catch was old and defective. The Texas Court of Appeals held that the plaintiff was limited in his proof to such defects, and could not prove that the guard rail was defective in that it had not been properly latched. It also held that the Pullman Company and the railroad hauling the Pullman car, if liable at all for the injury, were jointly liable. Judgment for the defendant was affirmed.—Blackman v. San Antonio & Aransas Pass (Tex.), 200 S. W., 412. Decided January 2, 1918. Rehearing denied January 30, 1918.

Right of Condemnation—Abandonment

A Missouri statute requires a railroad to finish its road and put it in operation in ten years from the time of filing its articles of incorporation. Another statute provides that all railroads may contract with each other or other corporations in any manner not inconsistent with the object of their creation. A predecessor of the C. B. & Q., instead of building its own track through the city of Hannibal, used, by contract, the track of a bridge company for about a mile, and had the right on determination of the contract to condemn land for a track on the west side of the bridge company's 50-foot strip. The Missouri Supreme Court holds, in condemnation proceedings by the C. B. & Q., that the company did "finish its road and put it in operation," so that its corporate powers did not cease. The agreement with the bridge company did not constitute an abandonment of its right to condemn property adjoining the track to afford further necessary facilities under a statute giving it the right to lay out its road, not exceeding 100 feet in width.—C. B. & Q. v. McCooey (Mo.), 200 S. W., 59. Decided December 3, 1917. Rehearing denied December 22, 1917.

Safe Approach to Train—Ownership of Station

In an action by a passenger against the Cincinnati, New Orleans & Texas Pacific for personal injuries while attempting to board a train at a station in Cincinnati, the petition alleged that between the platform and the third track, on which the train stopped, were two other tracks on which the defendant and two other companies, including the Baltimore & Ohio Southwestern, operated passenger and freight trains. While the plaintiff was crossing one of these tracks, the B. & O. S. W. negligently caused one of its trains to move thereon and strike and injure plaintiff. His injuries were alleged to be the proximate result of the defendant's negligence in failing to provide him with a safe approach to its train, and the concurrent negligence of the B. & O. S. W. (which was not sued) in moving its train over the track at that time and place. The Kentucky Court of Appeals holds that a demurrer to this petition was properly sustained. The plaintiff's injuries were not due to the fact that the physical condition of the approach was itself dangerous or defective. On the contrary, the approach was rendered dangerous solely by the negligence of the B. & O. S. W. In the absence of an allegation to the contrary, the court assumed that the B. & O. S. W. was the sole owner of the station and tracks, and the movement of its trains, as well as the rules and regulations governing their movement, were under its exclusive control.—Scott v. Cincinnati, N. O. & T. P. (Ky.), 200 S. W., 6. Decided January 25, 1918.

Carriage of Perishable Fruit

In an action against a carrier for the decay of a car of peaches shipped from Texas to Indianapolis, there was an inference of full refrigeration from payment of full charge therefor, and there was no showing that the time in transit, about 96 hours, was not reasonable dispatch. The Texas Court of Civil Appeals holds that a mere showing of delivery to the initial carrier in good condition and delivery by the terminal carrier in bad condition, with testimony that the peaches should have been carried 60 to 72 hours under proper refrigeration, did not warrant a directed verdict for the plaintiff. The inferences as to the railroad's negligence or fault being conflicting and not conclusive the case was for the jury. Judgment for the plaintiff was therefore reversed.—Texas & Pacific v. Woldert Grocery Co. (Tex.), 199 S. W., 1139. Decided December 27, 1917. Rehearing denied January 10, 1918.

Consignee's Duty to Remove Fruit

In an action by the consignor against a carrier for the conversion of a shipment of fruit, which the carrier sold because of the consignee's failure to unload it, the Texas Court of Civil Appeals holds that evidence of the market value of the fruit on August 22 did not support a judgment for the plaintiff, where the sale was made on August 25, the goods being of a perishable nature and subject to rapid deterioration. Under the rule established by the Texas courts the consignees had no right to retain possession of the car and peddle the fruit from it at retail, as they were doing, in violation of the instructions of the railroad. It was their duty to unload the car within a reasonable time; failing to do this they were liable for demurrage and for reasonable expenses incurred by the railroad in caring for the produce, after retaking possession, up to the time of the sale. Judgment for the plaintiff was reversed and the cause remanded.—Ft. Worth & Denver City v. Nabors Fruit Co. (Tex.), 200 S. W., 420. Decided January 9, 1918. Rehearing denied February 6, 1918.

Production of Bill of Lading

The New York Appellate Division holds that, under a straight bill of lading in the form provided by the rules of the Interstate Commerce Commission, the carrier's obligation is complete when it delivers the goods to the named consignee, and it need not require the surrender of the bill. Notice of the words "draft against B/L" on the face of the bill would not increase the obligation; nor does section 227 of New York Personal Property Law, added in 1911, operating as notice that the consignor intended to require payment of the draft before the buyer would be entitled to receive and retain the bill, apply to an interstate shipment, so as to require the consignee's production of the bill before delivery. A consignor of an interstate shipment, intending that the goods should not be delivered to the consignee without production of the bill of lading, may protect himself by taking an order bill, or, if preferring a straight bill, may protect himself by notification to the carrier, under section 219 of the said Personal Property Law, that a third party is the transferee of the bill.—Dusal Chemical Co. v. Southern Pacific, 168 N. Y. Supp., 617. Decided January 17, 1918.

Injury to Passenger's Hand in Door Jamb

In an action for personal injuries to a passenger it appeared that the plaintiff boarded the train at Atlantic, and at South Boston, where the train stopped, when about to alight, her left hand was caught in the jamb of the forward door of the car. At this station the track is straight, the grade, as estimated by an engineer called by the plaintiff, was about 2½ or 3 per cent down grade. The car was crowded and people were standing in the aisle near the forward door. She followed the passengers leaving the car and stopped on the car

platform for a moment to allow some people to precede her. As she was going onto the car platform she saw the brakeman approaching through the aisle of the car ahead and heard him shout, "Look out for your hand!" but the warning came too late, for the door swung to, crushing her fingers. There was evidence that as each passenger went out they held the door. There was nothing to show that there was a catch to hold the door in place when open, and there was no evidence of any defect in the door or its appliances. Nothing appeared to show by whom or at what time the door was opened. The Massachusetts Supreme Judicial Court considered this the difficulty with the plaintiff's case. It distinguished, as inapplicable here, the cases of Kellogg v. B. & M., 210 Mass., 324, 96 N. E., 525, and Silva v. B. & M., 204 Mass., 63, 90 N. E., 547, where the car door was opened by employees of the railroad. It held that a grade of 2½ or 3 per cent did not show negligence, nor did that fact require the presence of a brakeman at the door of each car where passengers were alighting, and his absence from the platform was not negligence. Exceptions to a verdict for the railroad were overruled..—MacGill-Allen v. N. Y., N. H. & H. (Mass.), 118, N. E., 248. Decided January 7, 1918.

United States Supreme Court

Maintenance of Roadbed for Men's Feet

A civil engineer who had been in the employ of the Southern Railway eleven years was directed to make a survey in one of its yards. While doing so he walked on the main track between the rails where he had seen others walk. As he stepped on a cross-tie, a small V-shaped piece of it, one and a half inches by six, being rotten, slivered off under his weight. His foot slipped down between the ties where the ballast was five or six inches below the top of the tie; and stumbling, he fell and dislocated his knee. The defect in the tie could have been discovered by sounding with an iron rod, and the standard of maintenance of roadbed prescribed by the road was to ballast to the top of the ties. But neither the condition of the tie, nor the failure to ballast to the top of the tie, was a defect of a character to impair safety in operation. The engineer knew that there were always some ties on the line which were partly decayed, and also that the ballast was occasionally below the top of the ties. On these facts he sought in a state court of North Carolina to recover damages from the railroad under the Federal Employers' Liability Act. The trial court refused the railroad's motion for a non-suit; and the jury rendered a verdict for the plaintiff. Judgment thereon was reversed by the Supreme Court of the State on the ground that there was no evidence of negligence; and the case came before the Supreme Court of the United States on writ of error. That court holds it to be clear that the railroad did not fail in any duty which it owed to the plaintiff, and affirmed the judgment of the State Supreme Court.—Nelson v. Southern. Decided March 4, 1918.

Fined $22,400 for Not Stopping Trains at County Seat

Suit was brought by the State of Texas to compel the Gulf, Colorado & Santa Fé to stop two interstate trains, No. 17 southbound and No. 18 northbound, at Meridian, the county seat of Bosque county, with a population of 1,500. Two other trains each way stopped there daily, but the State Railroad Commission found that these were insufficient for the needs of business, and granted the order sought. The Texas statute giving the commission power to make such order contains a proviso that "four trains each way, carrying passengers for hire, if so many are run daily, Sundays excepted, be required to stop as aforesaid at all county seat stations"—so that the commission seemed to have obeyed a statutory mandate, Art. 6676 (2) Vernon's Sayles' Statutes. Another article, 6672, imposes a penalty of not more than $5,000 for every failure to obey such order. The trial court confirmed the finding of the commission that the existing service was insufficient, and the order, and imposed a fine of $22,400, being $100 for each failure to stop. The Texas Court of Civil Appeals confirmed the finding and affirmed the judgment. The Supreme Court of the State refused to allow a writ of error, declaring itself unable to say that the conclusion of the lower court was unwarranted as matter of law.

The Supreme Court of the United States has affirmed the judgment of the State Court, the chief justice, Mr. Justice McKenna, and Mr. Justice McReynolds dissenting. The court, by Mr. Justice Holmes, said, in part: "If the reasoning that prevailed with the Court of Civil Appeals were applied to Meridian simply in view of the number of its inhabitants, there would be a serious question whether it could be sustained. For the consideration most emphasized was that no sleeping cars were attached to the local trains and that in order to make use of such accommodation on the trains in question passengers had to get in or out at stations from seven to fifteen miles away. It was thought that when the railroad furnished such accommodations to a part of the public it was bound to furnish the same to all others—a very questionable proposition as applied. The other fact relied upon was that passengers not infrequently came on trains Nos. 17 and 18 destined for Meridian and had to get out at Morgan or Clifton, the next stations to the north and south. We repeat that whether these facts would justify an intermeddling with interstate trains in favor of a place of this size, merely as such, would be a serious question. But the State Court sustained the order as one required by statute in favor of county seats, up to the number of four trains each way, Sundays excepted. The law is not directed adversely at interstate trains, but expresses the specific judgment of the legislature as to the needs of county seats, all of which, of course, it knew. If its judgment is correct, which we have no grounds for denying, the order may be justified, so far as its interference with interstate commerce is concerned, unless some other fact shows that the burden is too great."—Gulf, Colorado & Santa Fé v. Texas. Decided March 4, 1918.

Engines Changed to Burn Oil

In an action for the death of an engineman, caused by a locomotive boiler explosion, the negligence charged was that the boiler on the engine was insufficient in that (1) the button-heads of the crown-bolts were excessively and unnecessarily large and consequently unduly exposed to the direct heat produced by the fuel oil used on the locomotive; (2) the boiler was not provided with fusible safety plugs; and (3) scale was negligently allowed by the company, its officers and employees to accumulate on the crown-sheet in the boiler. The company denied negligence and set up the defenses of contributory negligence and assumed risk. Judgment for the plaintiff was affirmed by the Supreme Court of the State of Washington, and the case was taken to the Supreme Court of the United States. The ground of reversal principally urged was that the testimony did not warrant a recovery by the plaintiff. There was evidence that the engine had been a coal-burning engine, but that at the time of the explosion the fuel used was oil; that the button-heads on the bolts of the crown-sheet at the top of the fire-box were large ones when the engines were fired with coal, and were not changed with the change to oil; that the button-heads, because of their size, became overheated when oil was used for fuel, resulting in deterioration and weakening, and from the consequent giving way of the button-heads the crown-sheet came down and the explosion resulted. There was also testimony tending to show that there was an accumulation of scale and that there were no fusible plugs. On the part of the company there was testimony tending to meet and refute that of the plaintiff, and a considerable amount of testimony was introduced tending to show that the water in the boiler was too low, thereby causing the explosion from the fault of the deceased engineer in allowing it to become so. There was testimony for the plaintiff to the effect that the water was not too low at the time of the explosion. The jury having returned a verdict for the plaintiff, and the State Circuit Court and Supreme Court having found that there was evidence sufficient to sustain the verdict, the Supreme Court of the United States said that it was not its province to weigh conflicting evidence, and that the record showed testimony supporting the verdict; and that was as far as that court enters on that question. The court did not sustain the railroad's contention that so long as the large type of button-head had not been disapproved by the government inspector such fact was conclusive of the sufficiency of the type in use. It found nothing in the boiler inspection act to warrant the conclusion that there is no liability for an unsafe locomotive, in view of the provisions of section 2 of the act, because some particular feature of construction, which has been found unsafe, has not been disapproved by the federal boiler inspector.—Great Northern v. Donaldson. Decided March 4, 1918.

Equipment and Supplies

Railway supplymen will be specially interested in the announcement of the extended activities of the Railway Business Association on page 537, and in the articles on selling supplies to the railways under government control on pages 543 and 559.

Locomotives

THE PENNSYLVANIA EQUIPMENT COMPANY, 1420 Chestnut street, Philadelphia, is in the market for a second-hand 3 ft. gage ten-wheel locomotive with 14 x 18 or 20 in. cylinders or heavier.

CANADIAN GOVERNMENT RAILWAYS. The Railway Department, of which Hon. J. D. Reid is Minister, is mapping out a big program to meet the railway equipment requirements of the Dominion. The department figures that there are needed at least 150 engines and 7,500 box cars. Inquiries are being made as to prices, specifications and number of engines and cars each Canadian company can manufacture this season. A recommendation to the Cabinet Council will likely be made in a few days. The Grand Trunk is now using 45 government locomotives.

Passenger Cars

THE ATLANTIC LOADING COMPANY, 65 Broadway, New York, is in the market for 6 second-hand passenger coaches for immediate delivery.

Iron and Steel

THE CANADIAN GOVERNMENT has placed an order for 100,000 tons of steel rails with the Dominion Iron & Steel Company. The government will afterwards sell the rails to different Canadian railways.

Signaling

THE ST. LOUIS-SAN FRANCISCO has ordered from the General Railway Signal Company a mechanical interlocking, 35 working levers, to be installed by the railroad forces at Durant, Okla.

THE ATCHISON, TOPEKA & SANTA FE has ordered from the Union Switch & Signal Company materials for two interlocking plants at Hutchinson, Kan.; one at the Missouri Pacific crossing, 32 levers, and one at the Rock Island crossing, 36 levers.

THE BOSTON ELEVATED has ordered from the Union Switch & Signal Company the material for block and interlocking signals on its extension from Boston northward to Everett, Mass., about three miles. There will be 14 automatic block signals—style "N" light signals—and a mechanical interlocking plant at Everett. The new line leaves the existing line at Sullivan Square, Boston, where a complete new electro-pneumatic interlocking machine, 79 levers, will be installed. Alternating current is to be used for the control of all switches and automatic stops, as well as signals, relays and indicators.

THE WASHINGTON, BALTIMORE & ANNAPOLIS ELECTRIC RAILROAD, to provide for the heavy traffic to Camp Meade, is to install automatic block signals on its line, double track, between Baltimore and Naval Academy Junction, 14 miles, so as to space trains six minutes apart under clear signals, or three minutes under caution signals; and the signals are to be so installed that later, by putting in additional signals, the space between trains can be reduced one half. The signals will be the Union Switch & Signal Company's light signals, giving indications by colors; "three-position." The lights will have six-inch lenses, with a range, in sunlight, of 1,500 ft.

Supply Trade News

Edward U. Smith, chief draftsman with the Austin Company at Philadelphia, Pa., has been promoted to district engineer of the Philadelphia branch, with jurisdiction over the states of New Jersey, Delaware, Maryland and Eastern Pennsylvania.

Robert E. Frame, for the past six years assistant to the president of the Haskell & Barker Car Company, Michigan City, Ind., resigned, effective March 1, and has been elected vice-president of the Hutchins Car Roofing Company, with office in Detroit, Mich.

R. J. Himmelright has been elected vice-president of the American Arch Company. In his new position Mr. Himmelright will have charge of the service and road development work in the United States and Canada. Mr. Himmelright was born at Wadsworth, Ohio, and received his grammar and high school education at that place. Upon leaving high school he attended Wooster University for two years as a special student. Completing this work he entered Purdue University, graduating with the degree of mechanical engineer. While at Purdue University he specialized in railroad work. Immediately upon graduation he entered the service of the Lake Shore & Michigan Southern as a special apprentice. His work with the Lake Shore, while wholly in the mechanical department, covered a wide and varied field and gave him unusual opportunity to study locomotive operation. Leaving the Lake Shore he entered the service of the Locomotive Stoker Company as mechanical expert. In 1913 he accepted a position with the American Arch Company as traveling engineer and was made successively assistant to the manager of the service department and manager of the service department, which position he held at the time of his recent election.

R. J. Himmelright

Walter H. Allen, for several years in the track department of the Pennsylvania Steel Company, Steelton, Pa., and for the last two years with the Maxwell Motor Company, Detroit, has become associated with the Taylor-Wharton Iron and Steel Company, with headquarters at 30 Church street, New York.

W. F. Wagner, after 52 years' service, has severed his connection with William Jessop & Sons and is now sales manager of the Seaport Steel Company, which specializes in carbon tool steel and forgings, high-speed steel, alloy and carbon sheet steel and all varieties of high-grade steel.

G. W. Bichlmier has recently become associated with the machinery department of the Walter A. Zelnicker Supply Company, St. Louis, Mo. Mr. Bichlmier was formerly associated with the supply departments of the Missouri Pacific and Kansas City Southern and was secretary-treasurer of the W. L. Sullivan Machinery Company.

Paul T. Irvin, who has been associated with the Wells Brothers Company, and the Greenfield Tap & Die Corporation for 12 years, has resigned his position as sales manager of the gage division to accept the position of general sales manager of Lincoln Twist Drill Company, of Taunton, Mass. **Edward Blake, Jr.** (formerly of Wells Brothers Company), is vice-president and general manager of this company, and **Frank O. Wells,** president and **Frederick H. Payne,** vice-president of the Greenfield Tap & Die Corporation are directors.

At the annual meeting of the stockholders and directors of the Driver-Harris Company, Harrison, N. J., **Leon O. Hart** was elected treasurer and a director of the company. Mr. Hart was born in Hoboken, N. J., in 1885, and was educated at the Stevens Institute of Technology, where he graduated in 1907 with the degree of mechanical engineer. After graduation, he worked as a cadet engineer with the Public Service Gas Company of New Jersey for about one year. On October 2, 1908, Mr. Hart became associated with the Driver-Harris Company as electrical engineer, in which capacity he served until March, 1917, when he was elected assistant treasurer.

R. S. Cooper, whose election as vice-president and general sales manager of the Independent Pneumatic Tool Company, was announced in these columns March 8, entered the pneumatic tool field in 1903, after specializing in pneumatic engineering at Cornell University. After one year in the shops, becoming familiar with the processes of manufacture, and one year in the sales department at Pittsburgh, he was appointed eastern sales manager, with headquarters at New York city, and retained that position until his election to the vice-presidency, which necessitated his transfer to the general offices at Chicago, and led to his recent appointment as general sales manager, in charge of the distribution of Thor pneumatic and electric tools, and Thor motorcycles.

J. L. Price, assistant to the chairman of the board of directors of the Chicago Pneumatic Tool Company, Chicago, was recently elected vice-president in charge of finances. He was also re-elected assistant to the chairman of the board of directors and in that capacity will continue to act as the representative of the chairman. He was born at Springfield, Ill., and entered the employ of a bank in that city after graduating from high school. He later become associated with Francis Beidler & Co., Chicago, and for some years was general manager of a mill in the lumber district controlled by them. He served in various executive and financial capacities with Armour & Co., and for about five years was president of the Stock Yards National Bank of Ft. Worth, Tex. Later he was associated with the Atlantic National Bank, of the city of New York.

American Car & Foundry Changes

A. E. Ostrander, mechanical engineer at the New York office of the American Car & Foundry Company, has been made general mechanical engineer of that company and will have general supervision over all mechanical matters, reporting to **J. M. Buick,** vice-president and general manager. Mr. Ostrander's promotion has made necessary a number of other changes in the engineering department, the more important of which are as follows: **H. C. Lunger** has been made assistant to the general mechanical engineer, with headquarters at New York. **Fred G. Wolff** has been made mechanical engineer, with headquarters at St. Louis, Mo. **Norman Litchfield** has been made mechanical engineer, with headquarters at New York. **John G. McBride** has been made engineer of car construction, with headquarters at New York, and will report direct to the general mechanical engineer. **H. P. Field** has been made assistant engineer, with headquarters at Berwick, Pa., and will report to the engineer of car construction. **W. L. Yocum** has been appointed assistant engineer, with headquarters at Chicago. **H. D. Distelhurst** has been made assistant engineer, with headquarters at Washington.

A. E. Ostrander

W. H. Selden and **J. D. Thompson** have been made assistant engineers, with headquarters at New York. **W. J. Roa** has been made assistant engineer, with headquarters at St. Louis, Mo. Mr. Ostrander was born and educated in New Haven, Conn., and during his school vacations worked in various departments of the New York, New Haven & Hartford. He entered the drawing room of the New Haven in 1897 and was later employed by **Cornelius Vanderbilt** in designing cars, car trucks and other railway appliances. For a time he worked as a car designer and checker for the Standard Steel Car Company at Pittsburgh and in September, 1902, entered the service of the American Car and Foundry Company at New York and was successively employed as designer, estimator, and chief estimator. In February, 1904, he was made assistant mechanical engineer and October 1, 1915, was promoted to position of mechanical engineer of the New York office. He has been closely identified with the development of steel cars and especially steel passenger cars. Since the outbreak of the war, he has given considerable time to special work for the government and has served on the committee of engineers from car building companies that has been engaged in designing the standard freight equipment for the United States government.

Truscon Steel Company

The Trussed Concrete Steel Company, Youngstown, Ohio, announces a change in its name to the Truscon Steel Company.

Aside from this simplification of the name, there has been no change in the company, its organization, or management in any way.

The Trussed Concrete Steel Company, in its early days, devoted itself exclusively to reinforced concrete, introducing many new reinforcing products, such as the Kahn Bar, Floretyles, etc.

For many years, however, the activities of this organization have expanded far beyond the concrete field so as to include a large variety of steel products. Prominent among these might be mentioned the steel windows so widely used in building work, metal lath, pressed steel joists, all-steel buildings, inserts and other specialties.

For years the company has been generally known by the name "Truscon"—a simplified abbreviation of the longer name. For this reason "Truscon Steel Company" has been selected as the new name of the company.

Railway Steel Spring Company

The year ended December 31, 1917, was the best in the Railway Steel Spring Company's history. For the year the company's gross earnings were $23,905,714 as compared with $14,086,499 in 1916. The net earnings of $4,307,860, even after the deduction of a reserve of $3,500,000 for Federal taxes compared with $2,710,806 in 1916. After dividends of $945,000 were paid on the preferred stock there was available for dividends on the $13,500,000 common stock a balance of $3,362,860, equal to $24.91 a share as compared with $13.07 a share in 1916. Dividends of 5 per cent amounting to $675,000 were paid on the common, and the surplus at the end of the year was $8,657,801 as compared with $5,969,941 in 1916.

The Railway Steel Spring Company is in an exceptionally strong financial position. It has kept out of war business in the past, has been conservative as to its dividends and the result is now seen in the fact that on December 31, 1917, the company's working capital amounted to $9,313,681, as compared with $6,735,759 in 1916 or slightly over $4,000,000 in 1914. The declaration of $5 dividends is evidence that the policy will be continued.

F. F. Fitzpatrick, president of the company, in his remarks to stockholders, says in part: "Your board of directors has made a charge of $1,000,000 for depreciation of machinery, plants and gas wells, and applied the same to operating expense. In addition, a reserve of $1,000,000 has been made from the surplus earnings of the year for improvements, betterments and retirement of bonds. A reserve of $3,500,000 has been made to cover Federal income and excess profit taxes. The provision for payment of these taxes is in part represented by securities purchased for that purpose and carried under stock, bonds and investments.

"The sinking fund provisions of the Latrobe plant and Inter-Ocean plant 5 per cent bonds were complied with during the year, and the trustees of the sinking fund redeemed and had cancelled $133,000 in par value of the Latrobe and $132,000 in par value of Inter-Ocean bonds.

"The Latrobe plant 5 per cent. bonds provided for payment

of the principal on January 1, 1921, and in view of this approaching maturity and the favorable condition of your company's finances, the provision for calling of these bonds, at 105 and interest, was availed of by the company and pursuant thereto arrangements have been completed with the trustees of the mortgage for retiring them. There were outstanding on December 31, 1916, $2,994,000 in par value of Latrobe bonds. All of these bonds have now been retired, partly by cancellation of the bonds that were purchased by the company during the year 1917 and the remainder through payment to the trustee on December 31, 1917, of the sum required for their redemption on January 1, 1918.

"Your company encountered considerable difficulty throughout the year in conducting its regular line of business, due to the restrictive market in obtaining raw materials, and to the very tense situation prevailing with the railroad transportation facilities. It has therefore been deemed advisable to carry much larger amounts of materials in the inventories than heretofore. The policy of the company to increase the capacity of the different plants has been continued. All the plants have been maintained as far as possible in the best operating condition and for this purpose much larger expenditures than usual have necessarily been made and may continue to be made during the coming year.

"The year just closed shows results to be the largest in the history of the company, and the volume of business done, especially during the last few months of the year, has been conducted under the most trying difficulties, yet it is hoped that with better market and transportation facilities the situation will improve in the near future so as to make possible a very favorable showing for the year 1918."

The balance sheet follows in brief:

ASSETS

Plants, properties, etc.	$29,311,122	
Inventories: materials, supplies and products, finished and in process	5,113,038	
Stocks, bonds and investments	3,553,254	
Accounts receivable	4,077,856	
Other items	132,045	
Cash	857,906	
		$43,045,221

LIABILITIES

Capital stock, preferred shares	$13,500,000	
Capital stock, common shares	13,500,000	
Inter-Ocean plant 5 per cent gold bonds	2,967,000	
Accounts payable	652,791	
Reserved for preferred stock dividend, interest on bonds, Taxes, etc.	267,630	
Reserved for federal and excess profits taxes	3,500,000	
Surplus	8,657,801	
		$43,045,221

P. & M. Patent Claims Sustained

The United States Circuit Court of Appeals for the Seventh Circuit handed down a decision on March 9 denying the petition for rehearing filed some time ago by the Ajax Rail Anchor Company, Chicago, in the suit brought against it by the P. & M. Company, Chicago, for an infringement of the Kramer patent No. 1,014,155 by the Ajax rail anchor. The suit of the P. & M. Company versus the Ajax Rail Anchor Company has been in the courts since early in 1914. In the lower court the case went against the plaintiff but no opinion was handed down. In the Court of Appeals the decision handed down in the October, 1916, term was unanimous in favor of the P. & M. Company and Judge Mack rendered an opinion which, taken in conjunction with the opinion of the court in the suit of the Track Specialties Company versus Barnett, which was handed down at the same time, is considered to have defined the art as entirely independent from that of rail joints, tie plates or other rail fastenings. In this decision the court stated that "The fundamental features of the Kramer patent are employed in the Ajax structure in order to secure the same objects. The latter not only responds literally to the Kramer claims, but it operates on the same general principles and is essentially similar in form so far as form is material to obtain the results sought by Kramer. Transposition of parts without change of operation or function is of no importance. That the Ajax, by decreasing very considerably the amount of metal required without in any way altering the method of operation or the objects to be attained, represents a valuable improvement over Kramer, does not save it from the charge of infringement inasmuch as, despite the changes in form thereby secured, the structure is built and embodies Kramer's conception and contribution to the art."

The Bucyrus Company

According to the annual report of the Bucyrus Company, South Milwaukee, Wis., the net earnings for the year 1917 amounted to $854,281, of which approximately 75 per cent resulted from the company's usual pre-war products, and the remainder from munitions contracts and other special contracts arising from war demands. During the year a one per cent dividend was paid quarterly on the preferred stock, or a total paid during the year in dividends of $160,000. The earned surplus at the end of the year was approximately 30 per cent on the preferred stock issued and the cumulative unpaid dividends thereon aggregated 22 per cent after deducting the dividend payable on January 2, 1918.

A note issue of $1,000,000 dated December 15, 1915, matured on June 15, 1917, at which time $400,000 was paid from the cash resources of the company and the balance paid from the proceeds of a sale of a new issue of $600,000 in one-year six per cent gold notes maturing on June 15, 1918.

Owing to the unusual cash requirements for the payment of excess profits and additional income taxes, the amount of money involved in the inventory, the approaching date of maturity of the gold note issue and the uncertainties of the coming year, the directors considered it best not to increase the dividend disbursements above the rate of four per cent per annum.

The shipments of the usual products of the company exceeded in value those of the previous year by over 60 per cent, which is accounted for in large part by the higher prices prevailing during the later period. The company's products are to a greater or less degree essential to the successful prosecution of the war, and throughout the year many machines were ordered by the United States and allied governments. The larger portion of the output of the company went into coal mining equipment, consisting of coal stripping and coal loading machines, and a smaller quantity into iron and copper mining equipment. In addition, the company has received many contracts for material used directly in the prosecution of the war.

The company entered the year 1917 with a larger volume of orders on its books than in any previous year. New orders have more than kept pace with shipments, and 1918 opens, therefore, with more orders than the beginning of last year, exclusive in each instance of special contracts for unusual products.

Foreign business in 1917 was maintained at about the same proportion to the total business of the company as in the previous year, in which the volume of foreign orders was the greatest, up to that time, in the history of the company. Shipments of excavating machinery were made to Russia, France, Colombia, Chile, Cuba, Manchuria, England, Africa, Sweden, Costa Rica, Siam, Bolivia, Australia, New Zealand, Spain and the Federated Malay States.

At the annual meeting of the company held on March 5, 1918, the retiring board of directors was reëlected, and, in addition, Major F. R. Bacon, president of the Cutler Hammer Manufacturing Company, Milwaukee, Wis., and Fred Vogel, Jr., president of the Pfister & Vogel Leather Company, Milwaukee, were elected directors to fill two vacancies. The company's statement of assets and liabilities follows:

ASSETS

Cash	$146,012.98
Payments on Liberty Bonds	152,798.47
Accounts and Bills Receivable	1,449,641.19
Inventories	2,792,653.44
Land, buildings, machinery, patterns, securities, patents, etc.	6,781,116.63
Total	$11,322,222.71

LIABILITIES

Bills payable a/c Liberty Bonds		$140,790.00
Other bills and accounts payable		466,732.97
Advance payments received		463,045.17
Preferred dividend payable January 2, 1918		40,000.00
Reserves		289,999.77
Gold notes		600,000.00
Capital stock		
Preferred (Auth. $5,000,000.00) Issued	$4,000,000.00	
Common (Auth. $5,000,000.00) Issued	4,000,000.00	
		8,000,000.00
Surplus, as at January 1, 1917	$627,374.16	
Net earnings for year ended December 31, 1917, after deducting costs of manufacturing, repairs, and maintenance, administration and selling; royalties, depreciation, interest, insurance and taxes (including excess profits tax)	854,280.64	
	$1,481,654.80	
Less dividends	160,000.00	
Surplus, as at December 31, 1917		1,321,654.80
Total		$11,322,222.71

Financial and Construction

Railway Financial News

CANADIAN PACIFIC.—The annual report for the year 1917 shows gross earnings of the railway and of lake and coastal steamers amounting to $152,389,334. Net earnings from these sources aggregated $46,546,018; surplus, $36,316,875. Net revenues available for dividends were $33,848,192. After payment of all dividends, surplus from earnings was $12,420,919. The pamphlet report itself will be published within the course of a week or two.

NEW YORK, NEW HAVEN & HARTFORD.—John Skelton Williams, director of the division of finance and purchases of the Railroad Administration, has issued the following: "Director General McAdoo authorizes me to say that newspaper reports to the effect that the Railroad Administration has stated that the New Haven's obligations of about $45,000,000, maturing shortly, have been or would be provided for by the government, are incorrect. While it is hoped that the road may find some way to protect its obligations, no decision has as yet been reached by the government as to the extent, if any, to which it may extend aid to the system. The subject is now under consideration, and as soon as a decision is reached official announcement will be made."

OZARK VALLEY.—Judge Dyer in the United States District Court of St. Louis has placed a valuation of $150,000 on this road and ordered that if it has not been sold at that figure before April 22 it is to be sold at auction to the highest bidder.

PENNSYLVANIA RAILROAD.—The stockholders of this company at their seventy-first annual meeting on March 12, approved an increase of $75,000,000 in the indebtedness of the company, in accordance with the management's proposal providing for capital requirements, including maturing obligations. Concerning this sum, which is to be raised by this issuance of bonds and other obligations of the company, Samuel Rea, who was re-elected president, said: "In a large and growing corporation like the Pennsylvania Railroad there is a constant demand for funds with which to serve the government with the utmost efficiency. These funds will be required for new equipment and enlargement of freight handling facilities."

The shareholders ratified the acquisition by the Pennsylvania of the properties and franchises of the Cornwall & Lebanon and the Susquehanna, Bloomburg & Berwick railroads. After these matters were settled the chairman was authorized to appoint a committee of seven stockholders to nominate candidates for four directors to be elected on March 26.

A resolution offered by John Gribbel was adopted authorizing the directors and officers to execute for the company an agreement with the President of the United States to secure compensation for use of the railroad properties during their control by the government.

Railway Construction

ARCADE & ATTICA.—This company will build an engine-house at Arcade, N. Y., to be of cement block construction, 60 ft. wide and 75 ft. long.

FLORIDA EAST COAST—This company is building a paint shop at St. Augustine, Fla., to cost about $15,000. The structure is to have wood frame with slate roof and will be one story high, 88 ft. wide and 100 ft. long. The work is being carried out by company forces.

MAGDALEN RIVER.—The Quebec legislature has granted an extension of time in which to build this projected line along the Magdalen river valley to Little Falls, and has authorized the construction of a line from that point south and west, to connect with the Atlantic, Quebec & Western and the Canadian & Gulf Terminal, at Gaspe, or at some other point on either of these roads, also to build wharves, docks and deep water terminals at Gaspe. F. Murphy, secretary, New Carlisle, Que.

Railway Officers

Executive, Financial, Legal and Accounting

L. B. Butts, auditor of miscellaneous receipts of the Illinois Central, with office at Chicago, has been appointed auditor of station accounts, succeeding **C. C. Whitney**, who succeeds Mr. Butts.

G. H. Parker, assistant to vice-president of the Delaware & Hudson, with office at New York, has been appointed assistant controller of the Philadelphia & Reading with headquarters at Philadelphia, Pa.

The New Mexico Central was bought from the receivers on February 14, and a new company organized with the following officers: S. C. Munos, president; A. F. Mack, vice-president; F. L. Watson, treasurer; F. A. Wagner, general counsel, all with offices at New York. R. C. TenEyck, vice-president and general manager; C. A. Richardson, traffic manager and assistant treasurer, and D. C. Collier, general agent, all with offices at Santa Fe, New Mexico.

Operating

J. B. Wilson has been appointed trainmaster of the San Joaquin division of the Southern Pacific, with headquarters at Bakersfield, Cal., vice **D. S. Weir**, promoted.

R. M. Seale was appointed superintendent of car service of the Texas & Pacific effective March 5, with headquarters at Dallas, Texas, succeeding **R. E. Clarke**, who has entered government service.

L. M. Betts, having been granted leave of absence to enter the service of the regional director, **F. A. Spink**, on February 15, assumed charge of the office of the car accountant in addition to his duties as traffic manager of the Belt Railway Company of Chicago.

C. D. Bovard, acting assistant superintendent of the Canadian Government Railways, with office at Campbellton, N. B., has been appointed acting assistant superintendent, with office at Moncton; and **J. H. Wilson**, has been appointed acting assistant superintendent, with office at Campbellton, succeeding Mr. Bovard.

J. D. Clarke, chief clerk in the operating department of the Baltimore & Ohio, has been promoted to assistant superintendent of transportation, with headquarters at Baltimore, Md. **W. G. Curren**, superintendent of transportation, has been granted a furlough to serve in the office of **A. H. Smith**, regional director of eastern railroads, New York City.

M. C. Blanchard, district engineer of the Atchison, Topeka & Santa Fe, at Topeka, Kan., has been appointed division superintendent, with headquarters at Marceline, Mo., succeeding **R. H. Allison**, who has been transferred to the Illinois division, with headquarters at Chillicothe, Ill., to succeed **G. E. Ayer**, who has resigned to engage in other business.

J. E. O'Brien, superintendent of the Willmar division of the Great Northern, was transferred to the Dakota division with office at Grand Forks, N. D., succeeding **R. A. McCandless**, effective March 15. **C. E. McLaughlin**, superintendent of the Minot division, was transferred to the Willmar division with headquarters at Willmar, Minn., succeeding **J. E. O'Brien**, transferred. **R. A. McCandless**, superintendent of the Dakota division, was transferred to the Minot division with headquarters at Minot, N. D., succeeding **C. E. McLaughlin**, transferred.

F. L. Richards, assistant superintendent of the Chicago, Milwaukee & St. Paul, with headquarters at Sioux City, Iowa, was promoted to superintendent of the Sioux City and Dakota division, with same headquarters succeeding **L. B. Beardsley**, who was appointed assistant superintendent of the same division, succeeding Mr. Richards, effective March 10. **L. A. Turner**, was appointed trainmaster of the Iowa division

with headquarters at Marion, Iowa, succeeding **B. F. Hoehn**, promoted to superintendent of the Milwaukee terminals, succeeding **W. B. Hinrichs**, who was appointed stationmaster at Milwaukee, Wis., succeeding **C. W. Mitchell**, transferred, effective March 1. **D. W. Kelly**, has been appointed trainmaster of the Superior division with headquarters at Green Bay, Wis., succeeding **H. M. Gillick**, transferred to the Hastings and Dakota division, with headquarters at Aberdeen, S. D., succeeding **M. J. Flanigan**, promoted to superintendent of the Dubuque division, effective March 1. **W. F. Ingraham**, was appointed trainmaster of the Sioux City and Dakota division, with headquarters at Sioux City, Iowa, succeeding **C. H. Buford**, who was transferred to the LaCrosse division, effective March 1. **J. C. Hoffer** and **F. A. Miller** were appointed assistant trainmasters of the Chicago Terminals, the latter succeeding **B. G. Dolan**, transferred, effective March 10.

Henry Douglas Pollard, whose appointment as assistant general manager of the Central of Georgia, with headquarters at Savannah, Ga., has already been announced in these columns, was born in October, 1872, at Aylett, Va. He was educated in the public schools and at Aberdeen Academy; he also took short courses at the University of Virginia, and at Drexel Institute, Philadelphia, Pa. In 1891, he began railway work as a rodman on construction work with the Baltimore & Ohio, and in 1893, he was appointed assistant resident engineer of construction, at Wellsville, Ohio, on the Ohio Southern, now a part of the Detroit, Toledo & Ironton. From 1894, to 1898, he was assistant engineer maintenance of way on the Philadelphia division of the Baltimore & Ohio; the following year he served as transitman on the Central of Georgia. In 1900, he was appointed resident engineer of construction, and subsequently served consecutively as supervisor of track, trainmaster, roadmaster and from June, 1905, to 1910, as superintendent at Macon, Ga., on the same road. He was appointed assistant superintendent of the Sorocabana Railway, at San Paulo, Brazil in 1911, and later, was inspector general of the Campania Auxelliaire, at Santa Maria and Porto Alegre, Brazil. In 1913 he returned to the service of the Central of Georgia as valuation engineer and two years later was elected president of the Wrightsville & Tennille, with headquarters at Tennille, Ga., which position he held until his recent appointment as assistant general manager of the Central of Georgia as above noted.

H. D. Pollard

Traffic

J. V. Gilmour, advertising agent of the Chicago & Eastern Illinois, with headquarters at Chicago, has resigned to engage in other business.

R. W. Smock has been appointed general agent of the Los Angeles & Salt Lake with office at Pasadena, Cal., succeeding **Russell Ball** resigned to go into other business.

F. J. Burke, assistant general freight agent of the Texas & Pacific, with headquarters at New Orleans, La., will, in addition to his other duties, have charge of industrial development of the property.

John Fairman has been appointed, pro tem., general passenger and freight agent in America of the London & North Western Railway of England, with office at New York, succeeding **A. G. Wand**, who has relinquished active service.

T. P. Hinchcliff was appointed general agent of the Chicago, Burlington & Quincy, at Detroit, Mich., succeeding **E. T. Swan**, resigned, effective March 1. **G. A. Shields**, traveling freight agent, with headquarters at Burlington, Ia., has been appointed acting division freight and passenger agent, at Quincy, Ill., succeeding **Frank A. Hart**, temporarily assigned to the staff of the regional director at Chicago.

Engineering and Rolling Stock

T. W. McBeath, traveling fireman of the Canadian Government Railways, with office at Moncton, N. B., has been appointed master mechanic, with headquarters at Moncton.

W. A. Guild, division engineer of the Atchison, Topeka & Santa Fe, with headquarters at Chillicothe, Ill., has been promoted to district engineer, with headquarters at Topeka, Kan., succeeding **M. C. Blanchard**, promoted.

A. Leckie, division engineer of the Kansas City Southern, with office at Kansas City, Mo., has been appointed division engineer of the Southern division, with headquarters at Texarkana, Texas, vice **R. H. Gains** resigned to accept service with another company; and **W. J. Lank** has been appointed division engineer of the Kansas City Terminal division, with headquarters at Kansas City, Mo., vice Mr. Leckie.

W. F. Ackerman, shop superintendent of the Chicago, Burlington & Quincy, at Havelock, Neb., was appointed acting superintendent of motive power of the lines west of the Missouri river, succeeding **T. Roope**, granted leave of absence, effective March 1. **E. G. Johnson**, general master mechanic, with headquarters at Lincoln, Neb., has been appointed assistant superintendent of motive power, with the same headquarters, and his former position has been abolished.

Purchasing

W. F. Wright has been appointed assistant to the purchasing agent of the Louisiana & Arkansas, with office at Texarkana, Ark.

Obituary

Joseph Smith Leeds, manager of the Santa Fe Refrigerator Despatch Company, died in Chicago on March 12.

H. M. Hollister, who retired as treasurer of the Fairbanks, Morse & Co., Chicago, three years ago, died March 5, in that city, at the age of 80 years.

H. D. Teed, superintendent of telegraph of the St. Louis-San Francisco, with headquarters at Springfield, Mo., died at his home at St. Louis, on March 8, age 45 years.

Jacob W. Miller, formerly second vice-president and general manager of the New England Navigation Company, died on March 8, at his home in New York City. He was born in June, 1847, at Morristown, N. Y., and graduated from the United States Naval Academy at Annapolis, Md., in 1867. From 1882 to 1886 he was vice-president and general manager of the St. Louis, Fort Scott & Wichita Railroad, now a part of the Missouri Pacific. He subsequently served as general manager of the New York, Providence & Boston Railroad and the Providence & Stonington Steamship Company. From April, 1892, to the following August he was second vice-president of the New York, New Haven & Hartford, and later served as second vice-president and general manager of the New England Navigation Company and other steamship lines controlled by the New Haven. He resigned from the steamship service to become the executive head of the Cape Cod Canal Construction Company when the construction of the canal was begun in 1909.

A Dominican Railway Increases Its Rates.—The Samana & Santiago Railway, which runs from the port of Sanchez, on the Bay of Samana, to the towns of La Vega, Salcedo, Pimentel, Moca, and San Francisco de Macoris, in the cacao-growing region of the Dominican Republic, has announced an increase in its tariff on both freight and passengers, effective February 4. The reason given for the raise is the extraordinary cost of all materials required for the upkeep of its property.—*Commerce Reports.*